PB82-185802

Master Project Facilities Plan, Expansion of Reno-Sparks Joint Water Pollution Control Plant Cities of Reno and Sparks, Nevada Appendices E-G

(U.S.) Environmental Protection Agency
San Francisco, CA

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This volume contains Appendices E-G to the Draft Environmental Impact Statement (DEIS) on the Master Project Facilities Plan, Expansion of Reno-Sparks Joint Water Pollution Control Plant.

Appendix E - Surface Water Hydrology
Appendix F - Surface Water Quality
Appendix G - Hydrologic Modeling

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Draft Environmental Impact Statement

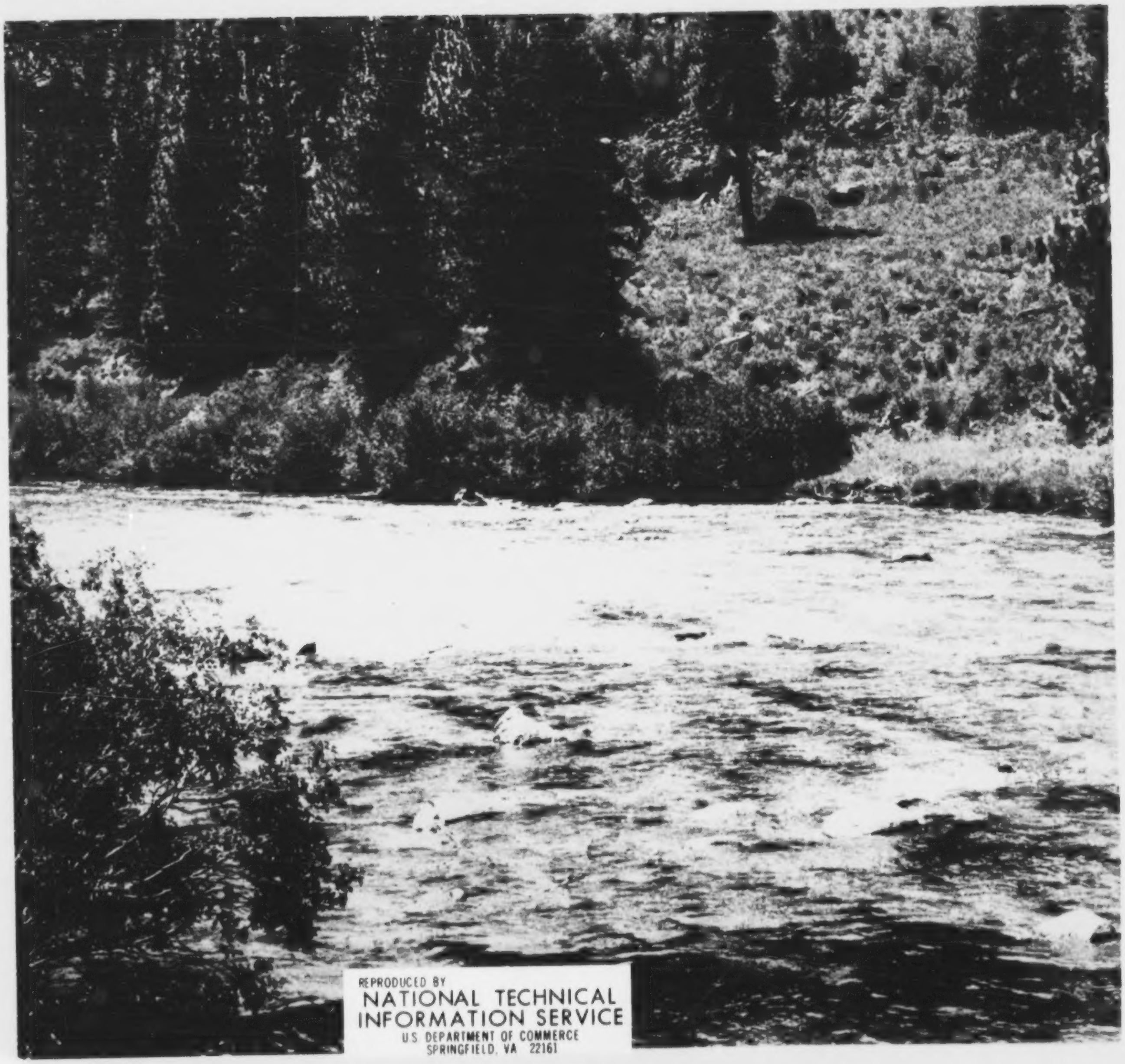
APPENDICES E-G

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MASTER PROJECT FACILITIES PLAN

Expansion of Reno-Sparks Joint Water Pollution Control Plant

Cities of Reno and Sparks, Nevada



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APPENDICES E-G

This volume contains Appendices E-G to the Draft Environmental Impact Statement (DEIS) on the Master Project Facilities Plan, Expansion of Reno-Sparks Joint Water Pollution Control Plant. There are 11 appendices to the EIS, covering the topics listed below. The appendices are bound in three volumes, containing Appendices A-D, E-G, and H-J, respectively. The DEIS, as well as the other two appendix volumes, are available from:

Mr. Thomas Severino, Project Officer
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215 Fremont Street
San Francisco, CA 94105

Appendix A - Regional Economy, Future Population Growth and Housing

This appendix discusses the following topics: the Reno economy; Reno's economic future; future population growth, including population projection and forecasting techniques, and forecasts of employment growth in the State of Nevada; and housing Reno's future growth.

Appendix B - Air Quality

This appendix includes the following information: meteorology data of the Truckee Meadows area; air quality monitoring data of the Truckee Meadows; and emissions forecast for the Truckee Meadows.

Appendix C - Water Law and Water Rights

This appendix discusses the following topics: institutional constraints affecting Truckee River water rights, including discussion and case briefs of major judicial and agency actions and institutional constraints affecting the Master Project, including the Endangered Species Act, state and federal water law principles, California-Nevada interstate water compact, court decrees, administrative actions and current litigation.

Appendix D - Cultural Resources Survey for the Master Project

This appendix discusses the historic and prehistoric background of the study area, discusses the results of a 10 percent cultural resources survey of lands potentially disturbed by Master Project alternatives and identifies potential mitigation measures for adverse impacts.

Appendix E - Surface Water Hydrology

This appendix discusses the following topics relating to surface water hydrology: climate; Truckee River flow characteristics; historical flows; diversion; consumptive uses; and M&I use.

Appendix F - Surface Water Quality

This appendix discusses the following topics relating to surface water quality: water quality standards; historical water quality; various water quality studies conducted by private and governmental agencies; existing water quality; and major pollutional inputs to the Truckee River.

Appendix G - Hydrologic Modeling

This appendix discusses the hydrologic modeling that was undertaken to identify Truckee River flow and quality changes that could result from Master Project alternatives. The appendix presents the assumptions and conclusions of the modeling; the land use assumptions developed to predict declines in agricultural land use resulting from projected urban growth; urban water use assumptions; and material supplementing the results published in the EIS.

Appendix H - Limnology of Pyramid Lake and Lahontan Reservoir

Topics discussed in this appendix include physical, chemical and biological characteristics and major ecological concerns regarding Pyramid Lake and Lahontan Reservoir.

Appendix I - Endangered and Threatened Species

This appendix discusses the life history, habitat requirements, reasons for decline, physical and biological factors necessary to restore natural populations and present efforts to restore the endangered cui-ui and threatened Lahontan cutthroat trout.

Appendix J - Fish and Wildlife Resources

This appendix discusses the life histories of fishes found in the Truckee River from Verdi to Pyramid Lake and identifies wildlife species found in the study area.

Appendix K - Background Agreements and Permits

Background agreements, permits and administrative actions pertinent to the Reno-Sparks JWPCP Master Project are included in this appendix.

RENO-SPARKS JOINT WATER POLLUTION CONTROL PLANT MASTER PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix E

Surface Water Hydrology

October 1980

Prepared For:

U. S. Environmental Protection Agency
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ACRONYMS

DOI - U. S. Department of the Interior
DRI - University of Nevada Desert Research Institute
DWP - Nevada Department of Water Planning
EPA - U. S. Environmental Protection Agency
gpd - gallons per day
JWPCP - Reno-Sparks Joint Water Pollution Control Plant
M&I - Municipal and Industrial
mgd - million gallons per day
PEL - Pacific Environmental Laboratory
TCID - Truckee-Carson Irrigation District
SPPCo - Sierra Pacific Power Company
USFWS - U. S. Fish and Wildlife Service
USGS - U. S. Geological Survey
WCOG - Washoe Council of Governments
WCWCD - Washoe County Water Conservation District
WPRS - Water and Power Resources Service (formerly known as the Bureau of Reclamation)

SURFACE WATER HYDROLOGY

Introduction

The Truckee River watershed, a landlocked basin within California and Nevada (Figure E-1), is typical of basins on the eastern slope of the Sierra Nevada Range. The Truckee River begins above Lake Tahoe and terminates in Pyramid Lake. The upper basin is located within the Sierra Nevada Range, whereas the lower reach is located in a desert. Elevations in the Truckee River watershed range from 10,776 feet at Mount Rose to 3,791 feet at Pyramid Lake. The total watershed has an area of 3,100 square miles (Pyramid Lake Task Force, 1971a) and can be divided into two distinct portions. The upper watershed, located in California, is an area of high rainfall and winter snow, while the lower watershed, located in Nevada, is characterized by a hot, dry climate with a small amount of rain and snow.

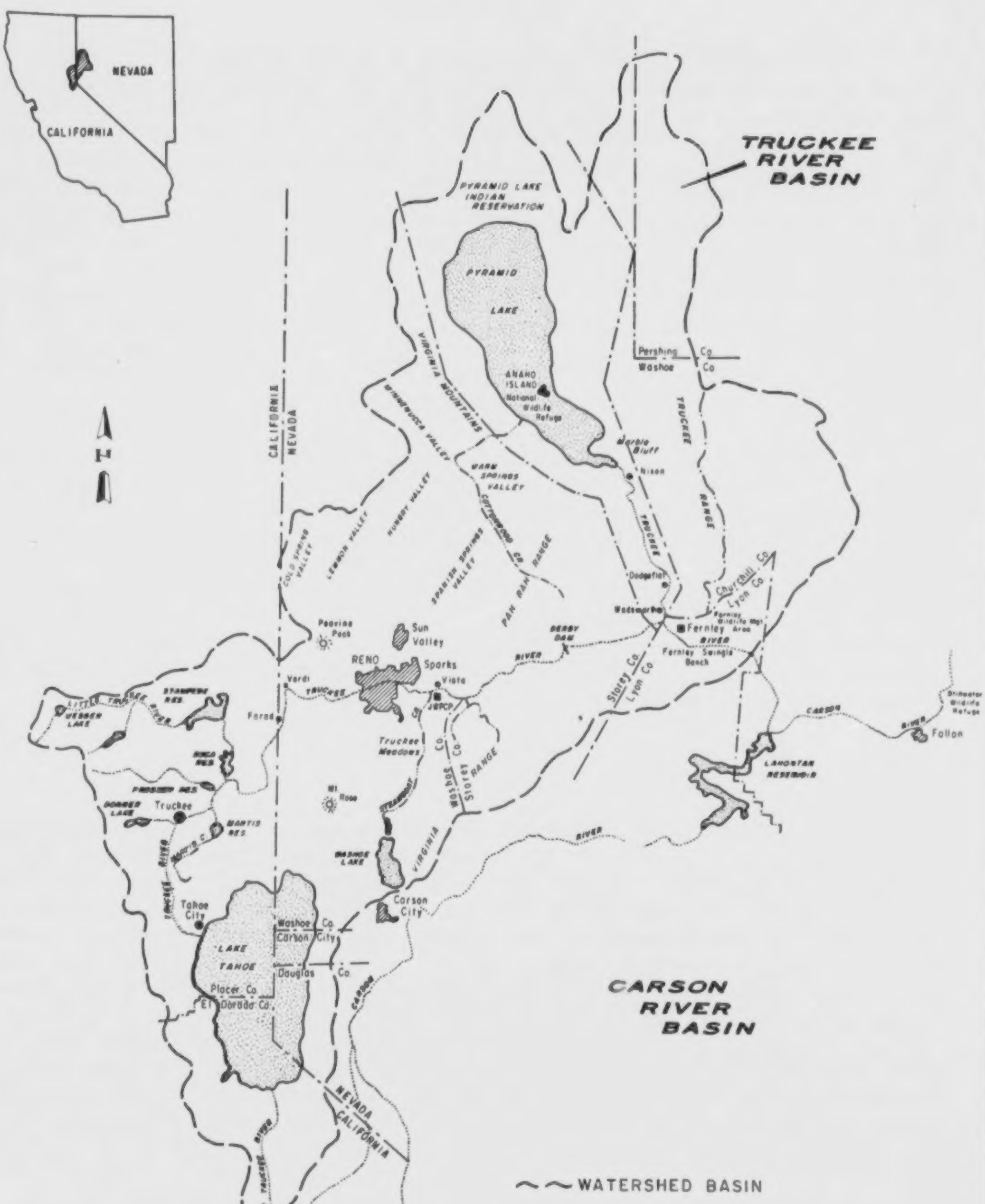
From the outlet of Lake Tahoe, the Truckee River flows north to the Town of Truckee, and then easterly through the Truckee Canyon. Below the Truckee Canyon, the river flows through the Truckee Meadows and into another canyon, often called the Truckee River corridor. Derby Dam, located 20 miles below Reno along the Truckee River corridor, diverts water into the Truckee Canal and divides the flow of the Truckee River into Pyramid Lake and Lahontan Reservoir. Downstream of Wadsworth, the floodplain widens into the Truckee River Valley and flows into Pyramid Lake.

Climate

The climate of the Truckee River watershed varies significantly from the upper to lower reaches. The Truckee Meadows climate is classified as semiarid (WCOG, 1978). Precipitation in the upper watershed comes in the form of rain and snow. Truckee, at an elevation of 5,982 feet, receives 28.12 inches of precipitation per year. This contrasts with the 7.2 inches per year that falls in Reno (WCOG, 1978). During some winters, warm storms move into the upper basin raising the freezing level. These storms provide rain and aid in melting the snow pack, which often results in flooding in the Truckee Meadows. Tropical thunderstorms, allowing intensive rainfall in a short period of time, also occur within the basin, and can cause flash floods.

Figure E-1

REGIONAL MAP



Temperatures in Reno vary from below freezing during the winter months to the 100s in the summer. It is not uncommon for the Reno area to experience a 45°F variation between daily maximum and minimum temperature (WCOG, 1978).

Prevailing winds in the Truckee Meadows area blow downslope off the Sierra. These winds are generally mild but can reach 80 mph (WCOG, 1978).

The lower river, being semiarid, experiences a high rate of sunshine and low humidity especially in the summer months. This in turn leads to a high rate of evaporation. This high evaporation rate has a large effect on the water stored in both Pyramid Lake and Lahontan Reservoir.

Truckee River System

Along the 119-mile reach from Lake Tahoe to Pyramid Lake, the Truckee River receives flow from several tributaries. The major contribution from tributaries occurs within the California reach of the river. The major tributaries and their average historical flows are listed in Table E-1. Regulatory structures have been constructed on several of these tributaries and therefore, many of the averages in Table E-1 represent a composite of flows before and after regulation.

There are 8 reservoirs that regulate the flow of the Truckee River. These reservoirs function for flood control, irrigation, municipal and industrial supply, recreation and fishery enhancement. Regulation began in 1870 with the construction of a timber dam across the outlet of Lake Tahoe. This dam was replaced by a concrete structure about 1913, raising the lake level to 6,229.1 feet, 6.1 feet above its natural elevation. This dam provides 744,600 acre-feet of storage. The dam is operated by the Truckee-Carson Irrigation District for WPRS in coordination with the Newlands Project. The historic variation in Lake Tahoe stage is given in Figure E-2.

The Little Truckee River, the largest tributary to the Truckee River, and its tributaries are regulated by dams at Independent Lake, Webber Lake, Stampede Reservoir, and Boca Reservoir. The historical flow of the Little Truckee River has averaged approximately 500 cfs during May, at the peak of spring runoff.

Prosser Creek Reservoir, constructed in 1963, regulates Prosser Creek. Martis Creek Reservoir, constructed in 1971 for flood control, regulates Martis Creek and has no conservation storage. Donner Lake a natural lake, has been

Table E-1

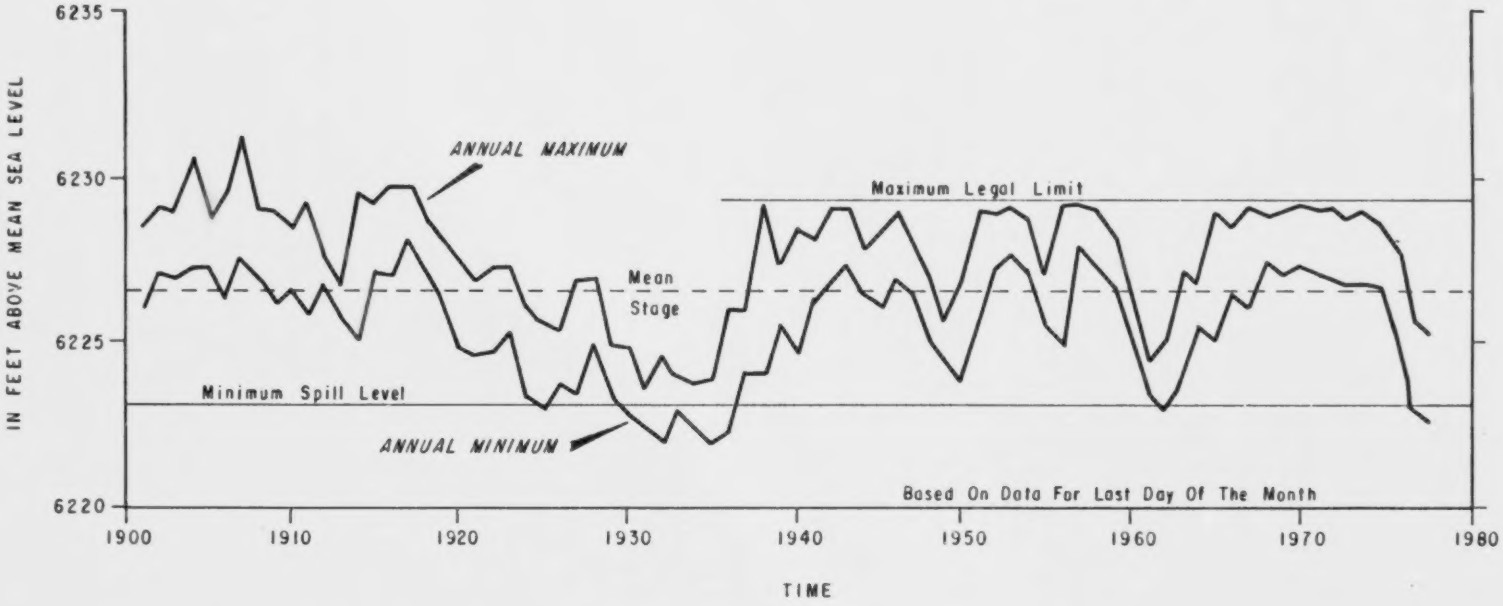
AVERAGE HISTORICAL FLOWS FOR TRUCKEE RIVER TRIBUTARIES
(cfs)

Tributary	Period of Record	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Donner Creek	1929-1979	27.5	25.4	32.5	27.9	26.8	28.6	46.4	87.7	41.6	12.4	8.5	19.6
Prosser Creek	1943-1979	55.7	39.1	56.4	54.2	56.9	85.6	158.9	237.9	130.3	51.8	25.1	63.7
Martis Creek	1959-1979	8.2	12.5	17.6	27.95	24.0	56.41	59.4	55.3	23.3	7.0	5.6	6.0
Little Truckee Creek	1911-1915 1940-1979	99.3	91.0	115.6	135.4	139.0	133.9	334.1	494.8	369.9	192.9	161.4	108.3
Steamboat Creek	1962-1979	6.9	5.8	5.0	10.4	12.3	14.8	13.9	18.7	25.9	14.0	8.5	6.4

SOURCE: USGS. Water resources data from Nevada. Water supply papers for water years 1900-1969. USGS water resources data for Nevada for water years 1970-1979. Water data reports.

FIGURE E-2

ANNUAL VARIATION IN STAGE OF LAKE TAHOE



EXTREMES:
Maximum - 6231.26 (July 14-18, 1907)
Minimum - 6221.74 (December 26, 1934)

Based On Data For Last Day Of The Month

ADOPTED FROM WCOG, 1978

regulated by a dam since the late 1800s. Its inflow to the Truckee River is not as significant as the other local tributaries.

The eight regulatory structures and their relative sizes are summarized in Table E-2. It is estimated that there are 398 square miles of water surface area in the Truckee River watershed, 91 percent of which is comprised of Lake Tahoe and Pyramid Lake (WCOG, 1978).

Water is diverted from the Truckee River at several locations for power generation, M&I and agricultural uses. Most diversions are for in-basin uses although some water is transferred into other basins, such as at Derby Dam and Lake Tahoe. The largest single diversion of water occurs at Derby Dam, where water is diverted into the Truckee Canal for use in the Carson River Basin.

Under natural conditions (i.e., without diversions or regulatory structures governing flow) Lake Tahoe was the control for the Truckee River. During spring runoff, water would be stored and released according to outlet characteristics of the lake. During drought years, the water level of the lake would occasionally drop below the rim and outflow would cease. During normal and wet years, water from Lake Tahoe would flow down the river, mixing with the tributary inflows, and eventually empty into Pyramid Lake.

Currently the flows of the Truckee River are regulated to meet downstream demands. The control of flows has been a controversial process since the early 1900s, involving litigation, court decrees, and various operating criteria for the system. The term "system" is used here because the Truckee River and regulatory structures are operated as an interrelated system. Among the controls are court decreed flows, measured at the Iceland gage near Floriston. The Floriston rates, as they are called, were initiated in 1915 and specify 500 cfs from March 1 to September 30 and 400 cfs from October 1 to the last day in February.

In 1935 the federal government, Truckee-Carson Irrigation District (TCID), Sierra Pacific Power Company (SPPCo), the Washoe County Water Conservation District (WCWCD), and certain individual users entered into the Truckee River Agreement. The Truckee River Agreement modified the Floriston rates to allow the winter flow rate to drop to 350 cfs when the level of Lake Tahoe is between 6,225.25 and 6,226.00 and 300 cfs when the lake level is less than 6,225.50. The Truckee River Agreement also established a first right to a 40 cfs SPPCo diversion for M&I purposes. At any one time 69 percent of the diverted flow is allotted to the WCWCD, and 31 percent to TCID and SPPCo.

Table E-2

REGULATORY STRUCTURES ON THE TRUCKEE RIVER

Reservoir	Source	Date Completed	Surface Area (acres)	Total Capacity (acre-feet)	Usable Capacity (acre-feet)
Tahoe	Truckee River	1870	123,000	125,000,000	744,600
Donner	Donner Creek	1877	960	11,000	9,500
Independence	Independence Creek	1879	725	18,500	17,500
Webber	Webber Creek	1924	45	N/A	1,275
Boca	Little Truckee River	1939	980	41,100	40,900
Stampede	Little Truckee River	1970	3,444	226,500	221,500
Martis Creek	Martis Creek	1972	770	20,400	19,600
Prosser Creek	Prosser Creek	1962	754	30,000	28,640

N/A - not available

In addition to the Floriston rates, minimum flows are specified at the outlet of Lake Tahoe, Prosser Creek Reservoir, and Stampede Reservoir. Below Lake Tahoe, minimum flows of 50 cfs during the winter and 70 cfs during the summer are specified for fishery needs. Water may be released from Lake Tahoe to maintain these flows if an equal amount is available for release at a later date from Prosser Creek Reservoir. This credited water in Prosser Creek Reservoir, known as Tahoe Exchange Water, is then available to help meet the Floriston rates (Pyramid Lake Task Force, 1971b). There is also a 5 cfs and a 30 cfs minimum fishery release from Prosser Creek Reservoir and Stampede Reservoir. On any given day, all fishery releases, unregulated flow and releases for downstream demands are summed and compared against the Floriston rates. If additional water is needed water will be released from Prosser Creek Reservoir, Boca Reservoir, and/or Lake Tahoe. Currently the Floriston rates are measured at Farad.

Flow Characteristics

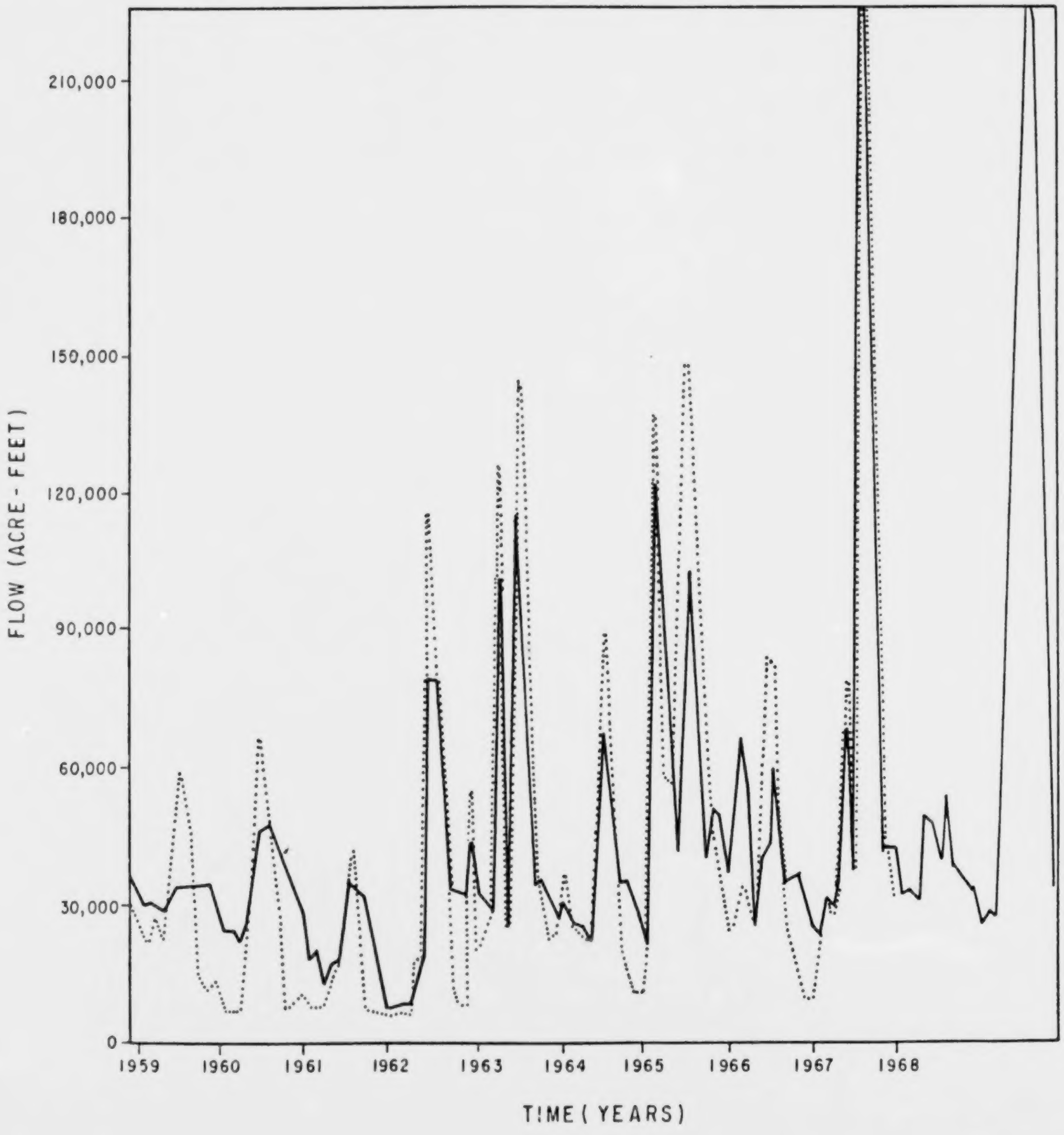
The flow of the Truckee River has been measured by the USGS at several locations for most of this century. The gage at Farad, the first on the river, began operation in September 1899. The gage at Tahoe City began operating the following March.

Flows recorded at Farad have been representative not only of climatic changes but also varying degrees of river regulation. If the effects of all diversions and regulating structures above Farad are removed, the natural flow at Farad can be computed. This was done for the period of historical flow record and a representative excerpt is shown in Figure E-3. Figure E-3 also shows the historical flow at Farad. The difference between the two lines is the total effect of the regulating structures.

If the flows for a given month are excerpted from each year of the historical record, a frequency distribution of flows for that month can be computed. In terms of the beneficial uses, monthly flows are often of greater importance than yearly averages. Frequency distributions were derived using a log Pearson Type III distribution for each month at Farad, Vista, and below Derby Dam. This analysis utilizes the daily flows for a given month over the historical record. The results are shown in Figures E-4, E-5, and E-6, and Tables E-3, E-4, and E-5.

Figure E-3

A PORTION OF THE HISTORICAL HYDROGRAPH OF THE TRUCKEE RIVER AT FARAD



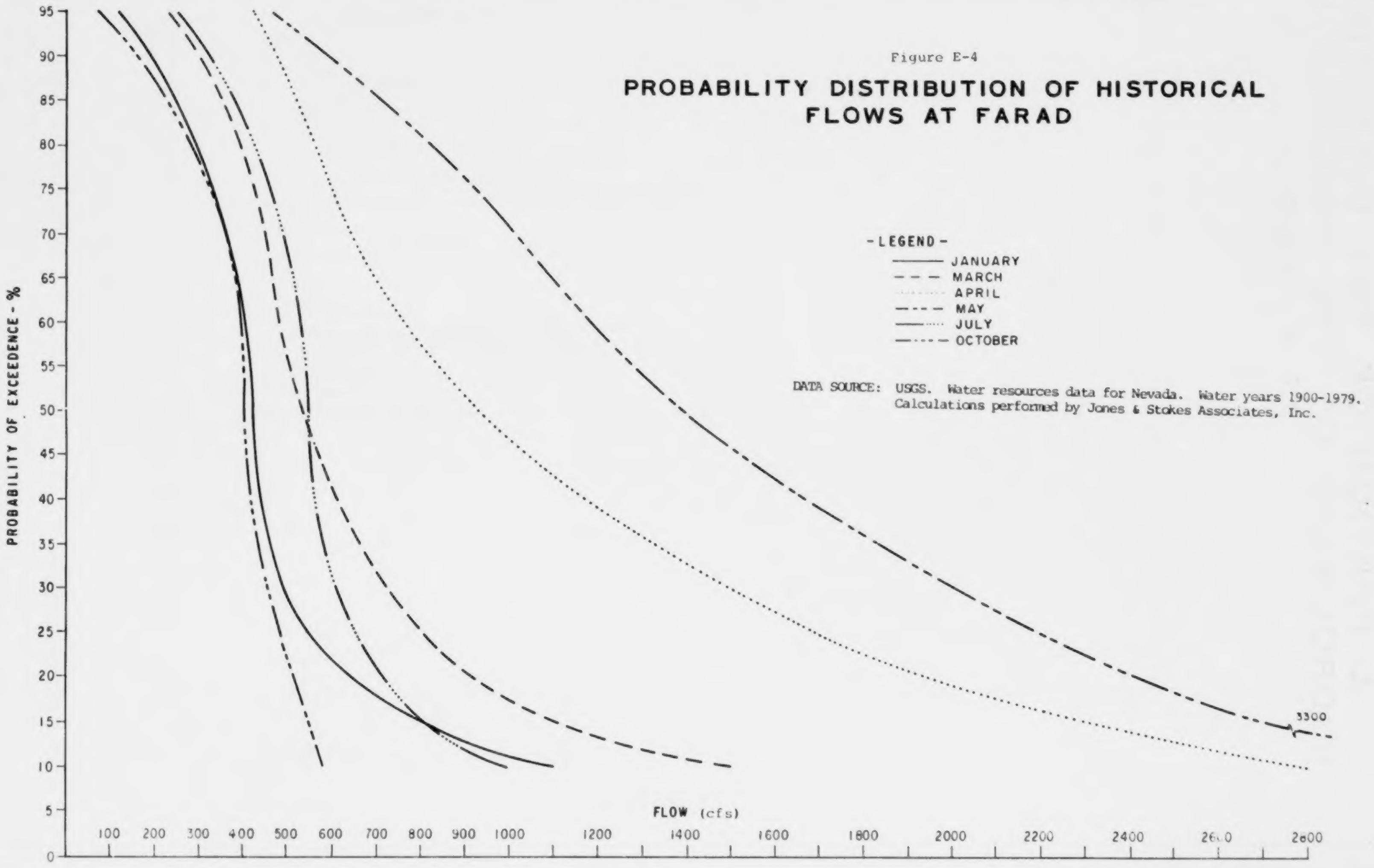
- LEGEND -

- ——— REGULATED FLOW
- ⋯⋯ NATURAL FLOW

DATA SOURCE: USGS. Water resources data for Nevada. Water years 1970-1979. Water resources data for California water supply papers 1900-1969.

Figure E-4

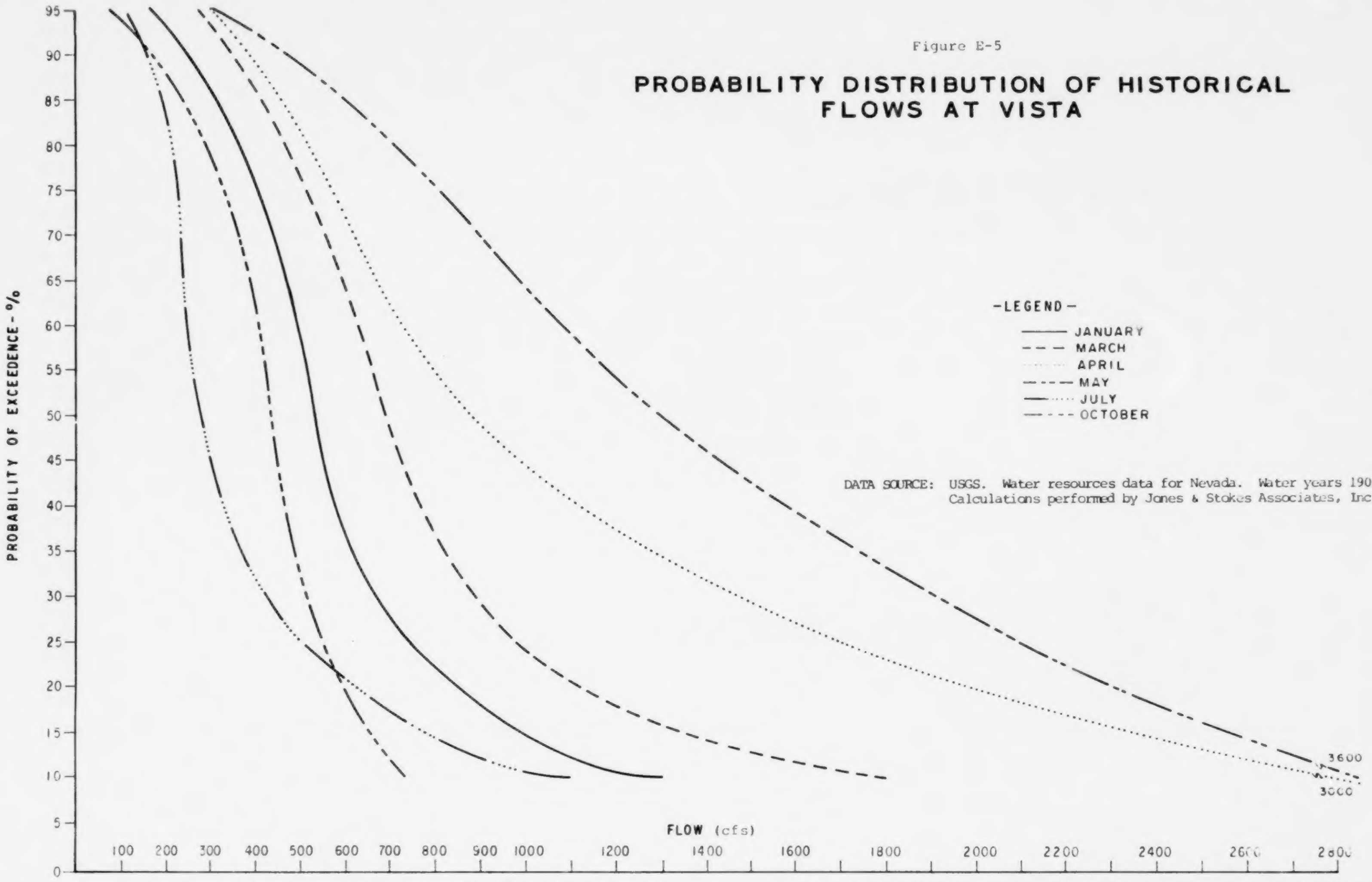
PROBABILITY DISTRIBUTION OF HISTORICAL FLOWS AT FARAD



DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979. Calculations performed by Jones & Stokes Associates, Inc.

Figure E-5

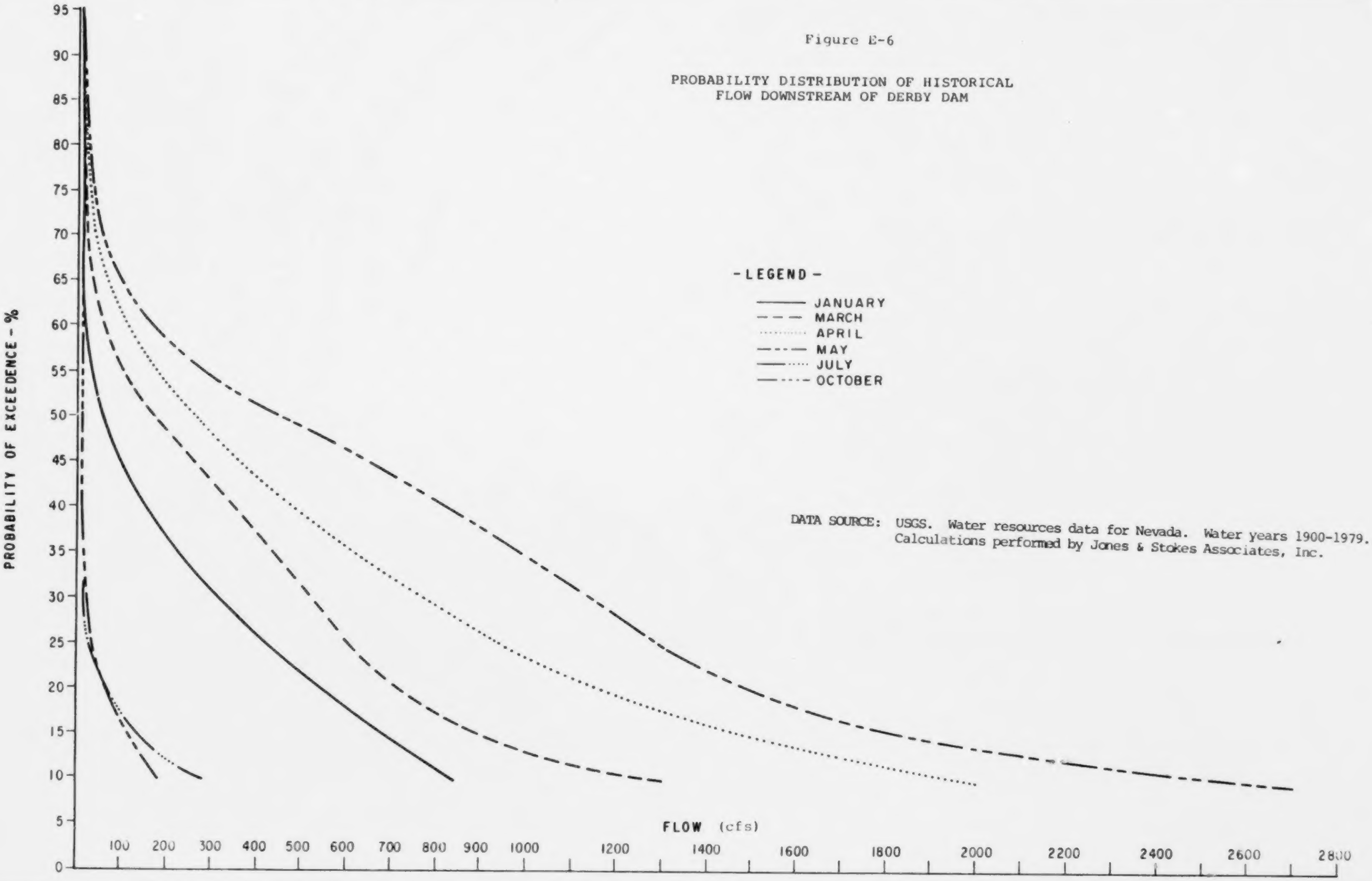
PROBABILITY DISTRIBUTION OF HISTORICAL FLOWS AT VISTA



DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979.
Calculations performed by Jones & Stokes Associates, Inc.

Figure E-6

PROBABILITY DISTRIBUTION OF HISTORICAL
FLOW DOWNSTREAM OF DERBY DAM



DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979.
Calculations performed by Jones & Stokes Associates, Inc.

Table E-3

MONTHLY PROBABILITY DISTRIBUTION OF HISTORICAL FLOWS AT FARAD
1900-1979
(cfs)

Probability of Exceedence of Given Flows (%)	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95	125	160	230	430	470	370	260	150	90	70	83	85
90	170	220	290	470	570	450	350	280	210	110	110	110
75	330	360	430	600	930	570	470	450	430	330	270	300
70	360	380	450	650	1,000	610	490	470	440	370	310	340
50	420	420	530	940	1,400	930	550	530	480	400	390	400
25	540	580	810	1,700	2,200	1,600	660	600	540	480	460	490
10	1,100	1,400	1,500	2,800	3,300	2,700	1,000	700	610	580	550	640

DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979. Calculations performed by Jones & Stokes Associates.

Table E-4

MONTHLY PROBABILITY DISTRIBUTION OF HISTORICAL FLOWS AT VISTA
(cfs)

Probability of Exceedence of Given Flows (%)	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95	160	210	270	300	300	210	120	90	68	68	110	120
90	210	290	340	360	380	250	170	170	140	100	140	170
75	410	450	510	570	810	380	220	230	260	330	400	420
70	430	480	550	620	900	460	240	250	280	360	420	440
50	530	580	690	880	1,300	830	290	280	350	440	520	530
25	740	870	980	1,700	2,100	1,500	510	370	450	550	600	640
10	1,300	1,800	1,800	3,000	3,600	3,100	1,100	620	620	730	810	920

DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979. Calculations performed by Jones & Stokes Associates.

Table E-5

MONTHLY PROBABILITY DISTRIBUTION OF HISTORICAL FLOWS BELOW DERBY DAM
(cfs)

Probability of Exceedence of Given Flows (%)	Months											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95	1.1	1.7	1.4	4.0	14	11	11	10	6.1	1.1	1.0	1.0
90	1.9	2.0	2.0	9.8	18	13	13	13	8.9	2.0	1.8	1.8
75	4.5	5.1	6.6	25	32	20	17	17	13	5.9	4.2	4.9
70	6.3	7.0	12	35	46	23	19	18	14	8.1	5.4	6.3
50	57.0	110	170	270	460	47	24	23	21	15	13	13
25	420	550	610	950	1,300	730	37	30	34	29	42	280
10	840	1,400	1,300	2,000	2,700	1,900	290	77	130	180	280	618

DATA SOURCE: USGS. Water resources data for Nevada. Water years 1900-1979. Calculations performed by Jones & Stokes Associates.

As can be seen in Figures E-4, E-5, and E-6, the period of highest runoff occurs during May for all three locations. This corresponds with the period of maximum spring runoff. A comparison between locations shows increasing flows from Farad to Vista but decreasing flows from Vista to below Derby Dam. In addition, below Derby Dam (Figure E-6) the probability of exceeding low flow values is slight, except during May. This is especially noticeable during the summer months when there is only a 10 percent to 25 percent chance of exceeding flows of 100 cfs. Also, it can be inferred that the flows below Derby Dam have historically been skewed toward the low flow condition.

The historical record reflects varying degrees of regulation, and as regulation increases, ability to meet legal criteria such as the Floriston rates should increase.

Diversions

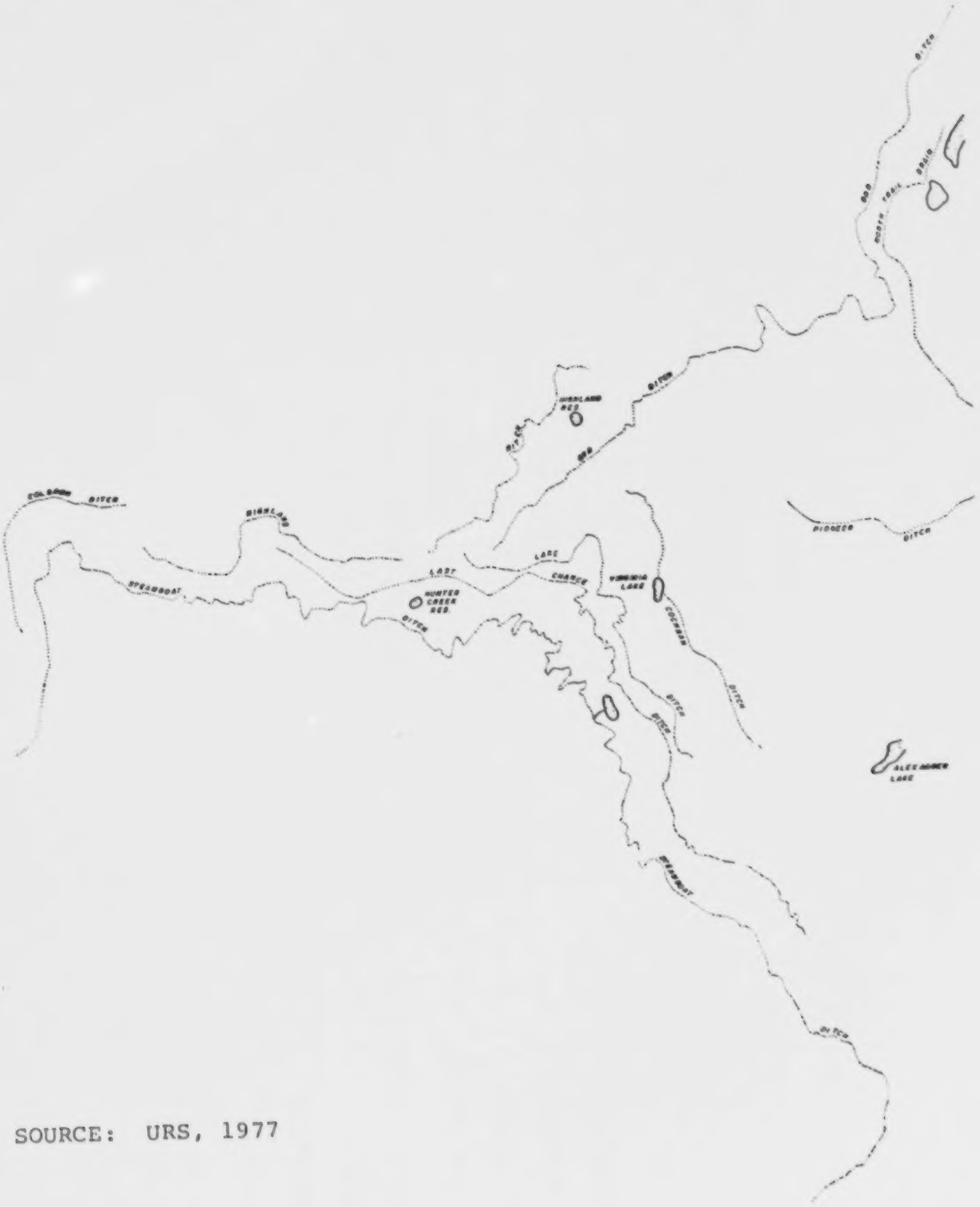
As mentioned earlier, water is diverted from the Truckee River at several points between Lake Tahoe and Pyramid Lake for municipal, industrial and agricultural uses. The majority of these diversions take place in the Truckee Meadows. Where at one time there were about 36 ditch and pump diversions, currently only 18 operate (Figure E-7) (DRI and Walters Engineers, 1979). Downstream of Truckee Meadows water is diverted for use along the Truckee River and in the Newlands Project area.

In Truckee Meadows water is usually diverted between May and October, although diversions have occurred until December, especially during recent years (Watermasters records, unpublished). Highland Ditch, used primarily for municipal purposes, diverts from April until December. The SPPCo's Idlewild pumps divert water directly from the river year-round for municipal needs. The average diversions through the major ditches are shown in Table E-6.

By examining the total agricultural diversion within the Truckee Meadows and comparing it to total irrigated acreage, it seems apparent that water is being applied in excess of quantities specified in the Orr Ditch Decree. It has been suggested that closer management and adherence to the Orr Ditch Decree would "save" water within the system. While it is not accurately known how much water would be so "saved", estimates range from 9,500 acre-feet to 25,000 acre-feet (Pyramid Lake Task Force, 1971b; DRI and Walters Engineers, 1979, respectively). It should be noted, however, that agricultural water applied in excess of need returns to the river by surface and subsurface flow or replenishes the

Figure E-7

MAJOR IRRIGATION DITCHES WITHIN THE TRUCKEE MEADOWS



SOURCE: URS, 1977

Table E-6

AVERAGE MONTHLY DIVERSIONS INTO SEVERAL DITCHES WITHIN THE TRUCKEE MEADOWS[1]

(acre-feet)

Ditch Name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Steamboat				1,501	5,682	5,754	6,183	5,834	4,489	2,806		
Highland				2,096	4,129	4,586	4,976	4,825	4,116	3,314	2,695	1,671
Last Chance				327	1,491	1,533	1,774	1,706	910	561		
Lake				358	1,838	1,906	1,984	1,992	1,583	889		
Orr			116	2,193	4,665	2,911	4,643	4,376	3,049	2,032	432	357
Idlewild	1,304	1,150	1,311	682	651	1,065	1,431	1,126	879	468	287	262
Pioneer	176	159	264	975	2,033	2,220	815	1,982	1,447	1,097	260	390

[1] Average of 1975-1977.

SOURCE: Watermasters records, unpublished. Available from the Federal Watermasters Office, P. O. Box 3571, Reno, Nevada.

groundwater. Evapotranspiration and other losses are probably greater from the excess diversion than it would get from the water if left in the river, but the significance of these losses has not been quantified. It seems likely that strict adherence to the Orr Ditch Decree would provide more water in that reach of river between the major diversions and the points of return (North Truckee Drain and Steamboat Creek), but how significant the addition would be to the total flow at Vista is uncertain.

There is a plan to consolidate all the ditches north and south of the river into single ditches (Crowe, pers. comm.). Implementation of this plan would follow a large-scale reduction of agricultural land and be designed to better allocate water to the remaining irrigated fields.

Below Vista 15 ditches divert water from the Truckee River to irrigate cropland. These ditches, the irrigated acreage and the diversions for the last few years are shown in Table E-7. With the exception of the Truckee Canal these ditches divert only during the April through October irrigation season. The peak month is generally June, July or August.

The largest single diversion along the Truckee River is Derby Dam, located 20 miles east of Reno. As part of the Newlands Project, Derby Dam, completed in 1905, was the first facility constructed under the Reclamation Act of 1902. It diverts water into the Truckee Canal, also part of the Newlands Project, for use along the canal and in the Carson Valley around Fallon, Nevada. The Truckee Canal conveys water from the Truckee River to Lahontan Reservoir on the Carson River. Completed in 1915 the reservoir stores both Truckee and Carson Rivers water for distribution by the TCID for irrigation and power generation (DOI, 1977).

Under the Orr Ditch Decree, TCID has a right to divert 1,500 second-feet of water. This right includes storage in Lahontan Reservoir and the irrigation of 232,800 acres in the Newlands Project. TCID is allowed to divert water in any way desired "providing that amount of water shall not exceed, after transportation loss and when applied to the land, 3.5 acre-feet per acre for bottom lands, nor 4.5 acre-feet per acre for benchlands..." (Orr Ditch Decree, 1944).

Lahontan Reservoir stores between 295,000 and 317,000 acre-feet of water (DOI, 1977) and provides recreational benefits. The water is currently being used to irrigate 61,000 acres of Newlands Project land (Pyramid Lake Task Force, 1971b).

Table E-7. Irrigation Ditches Between Vista and Pyramid Lake[3]

Ditch Name	Total Acres Listed in the 1978 Guidelines[4]	Decreed Water Rights Applied to the Land[4]	Total Annual Diversion From the River[5]		
			1976	1977	1978
	Acres	Acre-Feet	Acre-Feet	Acre-Feet	Acre-F
Largomarsino - Murphy	194	874	6,200	5,071	5,232
Largomarsino - Noce	11	142	1,250	738	474
Groton	34	151	1,480	1,607	1,446
Sheep Ranch	47	360	2,750	1,256	1,797
McCarran	134	961[1]	3,520	2,843	4,509
Hill	237	1,067	3,090	1,225	1,499
Washburn	33	131	700	633	1,026
Gregory	148	666	3,510	1,415	2,099
Herman	351	1,493	3,670	3,550	3,698
	61	352	1,040	566	856
Proctor	204	1,094	1,120	419	1,744
Follnagle	95	957	2,300	3,713	1,827
Gardella	56	226	320	607	325
Indian Ditch	1,000	23,786[2]	5,310	4,366	4,267

[1] Total of McCarran north and south
[2] Total of Indian Bench and bottom lands
[3] Does not include Truckee Canal
[4] From DRI, Walters Engineers, 1979
[5] Watermaster records

The year-round diversion at Derby Dam has historically averaged about 250,000 acre-feet per year with summer diversions going to irrigation and winter diversions going to storage in Lahontan Reservoir. Water from the Truckee Canal is also used to irrigate the Truckee segment of the Newlands Project (Figure E-8).

Although TCID has a right to divert 1,500 cfs into the Truckee Canal, the Truckee Canal has a flow capacity of 900 cfs, as limited by the capacity of one of three tunnels along the canal (Bianchi, pers. comm.). Eight miles below Derby Dam, the canal has two facilities for spilling excess water back to the river. DOI (1977) estimated that 17,000 acre-feet of the water diverted to the Truckee Canal returns to the Truckee River at these spills. There are two USGS gages along the canal -- one near Wadsworth above Tunnel #3, and the other near Hazen. Between these two gages there are approximately 20 diversions into the Truckee Division, accounting for 40,000 acre-feet per year of diversions.

The historical flow below Derby Dam is shown in hydrograph form in Figure E-3. The effect of the diversion at Derby Dam can be easily seen here. A summer low-flow period exists below Derby Dam as shown by the low points in the hydrograph. These correspond with periods of high diversions at Derby Dam.

Return water from irrigation within the Newlands Project goes to the Carson Lake pasture, Stillwater Wildlife Refuge, Carson Sink and Canvasback Gun Club. The Fernley Wildlife Management area is fed by runoff from the Truckee Division of the Newlands Project.

In addition to the transfer at Derby Dam, several inter-basin transfers occur within the Lake Tahoe region, amounting to about 15,200 acre-feet per year (WCOG, 1978). They are:

1. About 3,250 acre-feet per year of domestic sewage is diverted from South Lake Tahoe and transported to the Carson River basin.
2. About 1,700 acre-feet per year is diverted from Echo Lake to the American River for power generation.
3. About 720 acre-feet per year is diverted from Malette Lake for Carson City/Virginia City water supply.
4. About 1,344 acre-feet per year is diverted from stateline Roundhill Village area to the Carson River.
5. About 750 acre-feet per year is diverted from Incline Village to the Carson River (WCOG, 1978).

Outside the Tahoe area, about 7,500 acre-feet per year is diverted from the Little Truckee River for irrigation of Sierra Valley in the Feather River basin.

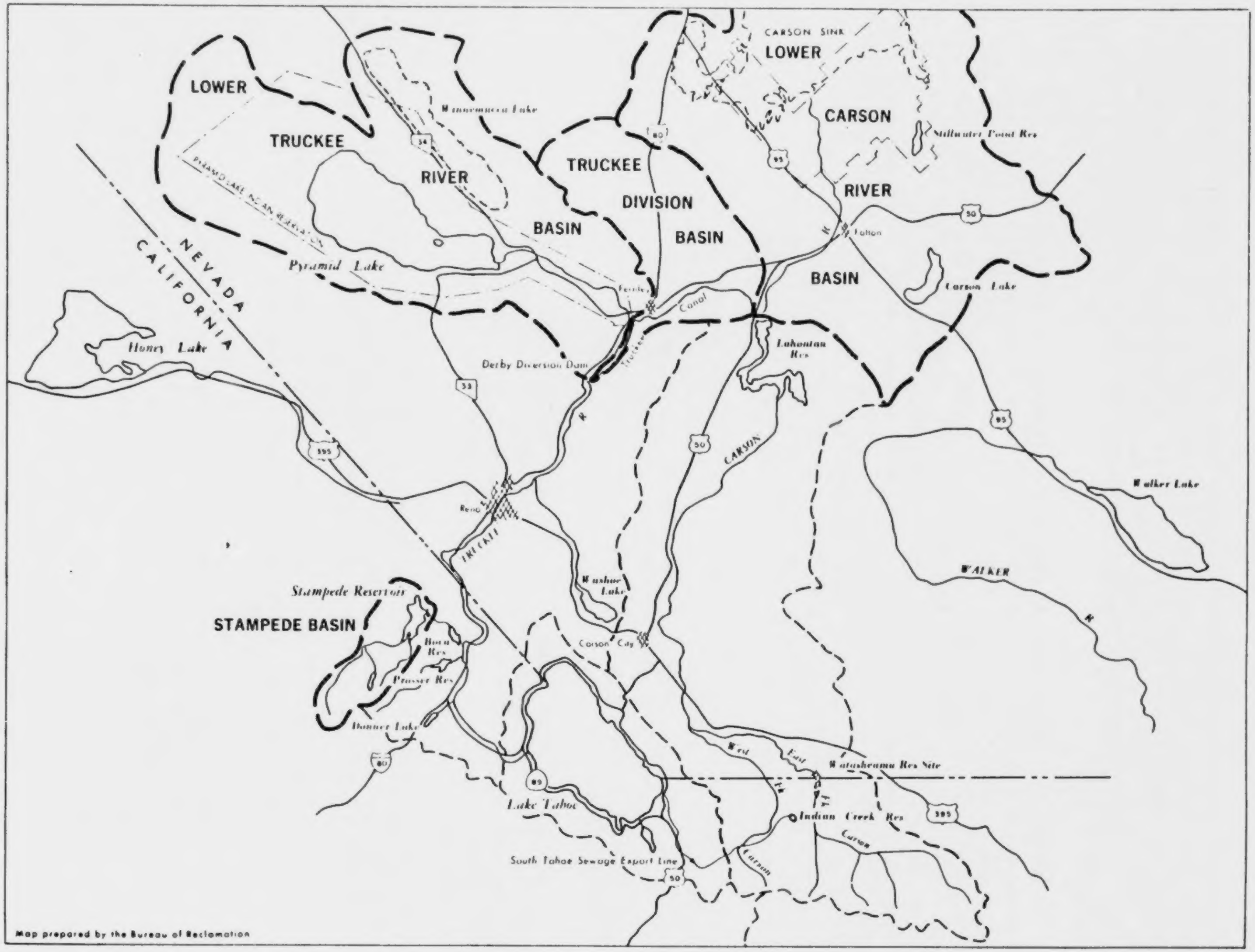


Figure E-8. Lower Truckee-Lower Carson River Basins.

SOURCE: Department of the Interior (DOI), 1977. Draft Environmental Statement of the Proposed Operating Criteria for the Lower Truckee - Lower Carson River Basins, Reno, Nevada.

It should be noted that since both Nevada and California law prohibits the disposal of sewage in the Tahoe basin, any increase in urban land use in the basin will result in an increase in exported treated sewage effluent and therefore increase the interbasin transfer of Truckee River water, principally to the Carson River basin.

Consumptive Uses

The primary consumptive use of the Truckee River is evapotranspiration. Agricultural irrigation and river, ditch, and lake surfaces provide the base for the majority of evapotranspiration. Irrigation water is applied by flooding fields which enhance evapotranspiration. As the water moves across the field, portions are evaporated, transpired by plants, drained off as tail water or percolated to the groundwater. The groundwater portion in certain parts of the Truckee Meadows is available to phreatophytes (deep-rooted plants which utilize groundwater as a major source of water), which transpire that water. It has been estimated that phreatophytes remove up to 8,500 acre-feet per year from the Truckee Meadows and surrounding area (Nevada Engineers office, 1971a). That portion of groundwater not used by plants or pumped for surface use eventually moves back to the river or replaces pumped groundwater. Also, there are several groundwater discharge points where the water table contacts the surface. These wetland areas also experience evaporative losses.

During studies of three ranches in the Carson Valley, Guitjens, et al. (1978) found that 35 to 54 percent of applied water showed up as return water in 1974 and 30 to 54 percent in 1975. DRI and Walters Engineers (1979) found a 44 percent return flow. Within the Spanish Springs Valley, URS (1977) found a 35 percent return of agricultural water applied to the fields.

Municipal and industrial water use generally has a lower consumptive use rate than agriculture. Industrial consumptive uses vary according to the use and the treatment and disposal processes. The majority of the industry in the Reno-Sparks area is not water intensive (Crowe, pers. comm.).

Water consumption by municipal use varies throughout the year, with peak consumption occurring during the summer months. Peak consumption is associated largely with irrigation and maintenance of landscaped areas. Not all water used in landscape maintenance is consumptively used, however, since some portion does percolate to the groundwater and is available for other uses. Domestic consumption, the difference between what is provided as indoor water supply and the production of sewage, does not vary much throughout the year, as seen by the relatively stable flow of effluent from the Reno-Sparks JWPCP records. Landscape consumption, however, varies considerably. During the summer when landscape irrigation is high, water is consumed by lawns and other plants, evaporates from the soil and plant surfaces, runs off to the storm drains, and percolates to the groundwater.

As urban growth continues the total amount of water that is domestically consumed will increase in proportion to population growth. Landscape consumption is also likely to increase over current levels as more land is urbanized. It is reasonable to expect a greater amount of landscaped area associated with individual homes, new parks, and golf courses. The increase in consumptive use associated with landscaping can be reduced by changing irrigation practices and using plant and grass species that have minimal water requirements.

The largest amount of evaporation that takes place within the Truckee River basin occurs as evaporation from water surfaces, primarily lakes and storage reservoirs. Due to elevation differences within the basin, evaporation rates vary significantly (Table E-8).

Table E-8

EVAPORATION RATES IN THE TRUCKEE RIVER WATERSHED

Water Body	Rate ft/yr
Lake Tahoe	2.87*
Pyramid Lake	4.00**
Lahontan Reservoir	5.03***
Boca Reservoir	3.50****

Data Source:

*California Department of Water Resources Records[3].
**Pyramid Lake Task Force, 1971a.
***Clyde-Criddle-Woodward, 1968.
****California Department of Water Resources, 1974.

Data from Table E-8 indicate that Pyramid Lake and Lahontan Reservoir have relatively high evaporation rates. The evaporation rate at Lake Tahoe, on the other hand, is relatively low. It should be noted that since the surface area of Lake Tahoe is nearly constant, the total evaporated water remains essentially unchanged as the height of Tahoe varies.

Pyramid Lake loses approximately 470,000 acre-feet per year through evaporation and Lahontan Reservoir loses approximately 50,000 acre-feet per year. These contrast with the 350,000 acre-feet loss per year from Lake Tahoe.

Lake Tahoe and Pyramid Lake evaporative losses are historical since they are natural lakes, but evaporation losses from Boca, Stampede and other reservoirs are man-induced. Given that these reservoirs exist and will remain on the river, the major factor controlling total evaporation loss in the Truckee River system is the reservoir management procedures. One such management procedure is to store water in upstream reservoirs, such as Lake Tahoe, rather than in Lahontan Reservoir to control evaporative loss.

In the past, the operation policy of Lahontan Reservoir has been to divert water from the Truckee River during the winter for storage; however, this often does not allow room for spring runoff and precautionary drawdowns occur. Water from these drawdowns is spilled to the Carson Sink and the wildlife areas.

It has been suggested that manipulation of the storage location of water in the Truckee-Carson basins and management of storage timing in Lahontan Reservoir could significantly reduce evaporation and precautionary drawdown losses. Also, the Pyramid Lake Task Force (1971a) reported that the drying up of Sheckler Reservoir and Ole's Pond, two control facilities below Lahontan Reservoir, could save up to 25,000 acre-feet of water.

A major source of water to the wildlife areas is the precautionary drawdowns from Lahontan Reservoir. Elimination of these spills would adversely affect the wildlife areas.

Municipal and Industrial Water Use

The Truckee Meadows area is currently served by several water districts that obtain their water from surface and groundwater sources.

The water companies present in the Truckee Meadows are:

Sierra Pacific Power Company
Hidden Valley Water Company
Trans-Sierra Water Company
Sun Valley Water District
Panther Valley Water Users District
Silver Lake Water Company

The SPPCo is the largest water purveyor in the Truckee Meadows area. The other companies obtain water from the SPPCo or from a separate system. Sun Valley and Panther Valley Water Districts obtain water from the SPPCo (DWP, 1978). Silver Lake Water Company, serving the Stead area, pumps water from its own wells and receives water from the SPPCo (Firth, pers. comm.). The Hidden Valley and Trans-Sierra systems obtain water entirely from groundwater. The Hidden Valley system (metered) served about 510 customers in 1978 (Helseth, pers. comm.). Trans-Sierra Water Company (unmetered) used approximately 250 acre-feet in 1972-73 (DWP, 1978). Currently, both Hidden Valley and Trans-Sierra Water Companies are having problems with poor groundwater quality.

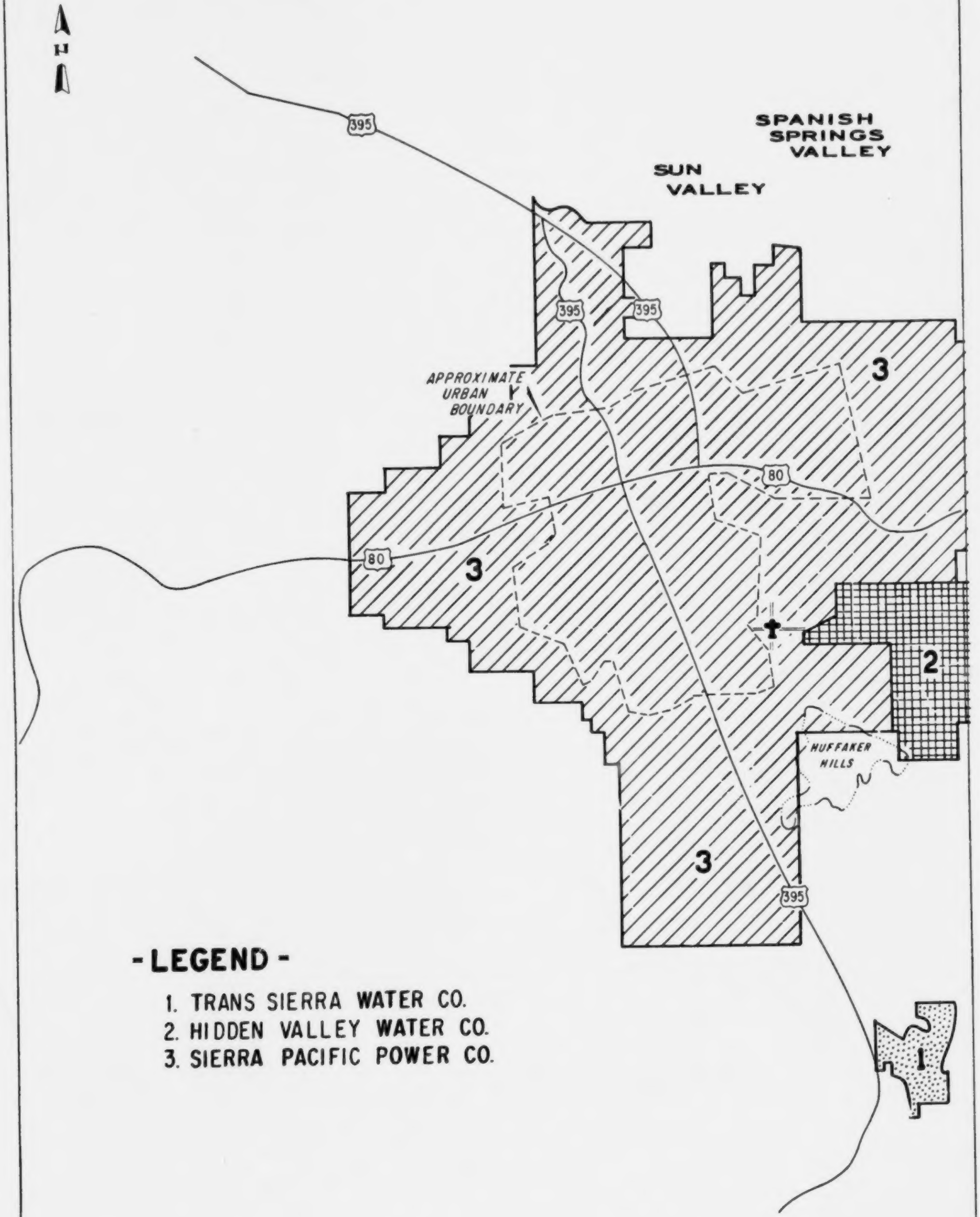
The SPPCo serves 43,300 acres within the Truckee Meadows and 3,000 acres in Stead (Figure E-9) (DWP, 1978). Approximately 85 percent of SPPCo's water is from surface sources; the remaining 15 percent is from groundwater (Firth, pers. comm.). A yearly distribution of water supplied from the two sources for 1978 is given in Figure E-10. The greatest demand for M&I water occurs during the summer months when there is also a high demand for agricultural and fisheries uses. This is also the time of generally decreasing flows in the Truckee River.

The historical water use and associated number of customers for SPPCo are given in Table E-9 and Figure E-11. As seen in Figure E-11, water use generally follows customer numbers, as would be expected, but it also varies year to year due to other factors such as available water and conservation practices.

The SPPCo obtains water from both surface diversions and groundwater. Groundwater is pumped from 16 wells located around the Truckee Meadows. Two of these, however, experience quality problems and are used only for emergencies (SPPCo, 1976). The remaining 14 wells have a combined production capacity of 38.0 MGD. Surface water is taken from Hunter Creek and stored in Hunter Creek Reservoir. Also, water is pumped from the Truckee River by the Idlewild and Glendale pumps and diverted into the Highland Ditch for storage in Highland Reservoir. Water is stored and distributed by way of 14 reservoirs with a total capacity of 19.2 million gallons (1976 conditions) (Firth, pers. comm.). Diverted water is treated at the Hunter Creek, Idlewild, Highland and Glendale treatment plants, at rates of 15, 20, 30, and 25 MGD, respectively. These treatment rates are not always met, however, due to sediment during spring runoff or decayed organic matter during the fall. Also, oil and grease often enter the river due to spills along the highway or in the urban area, thus causing a closure of the system until the water clears (Firth, pers. comm.).

Figure E-9

WATER SERVICE AREAS

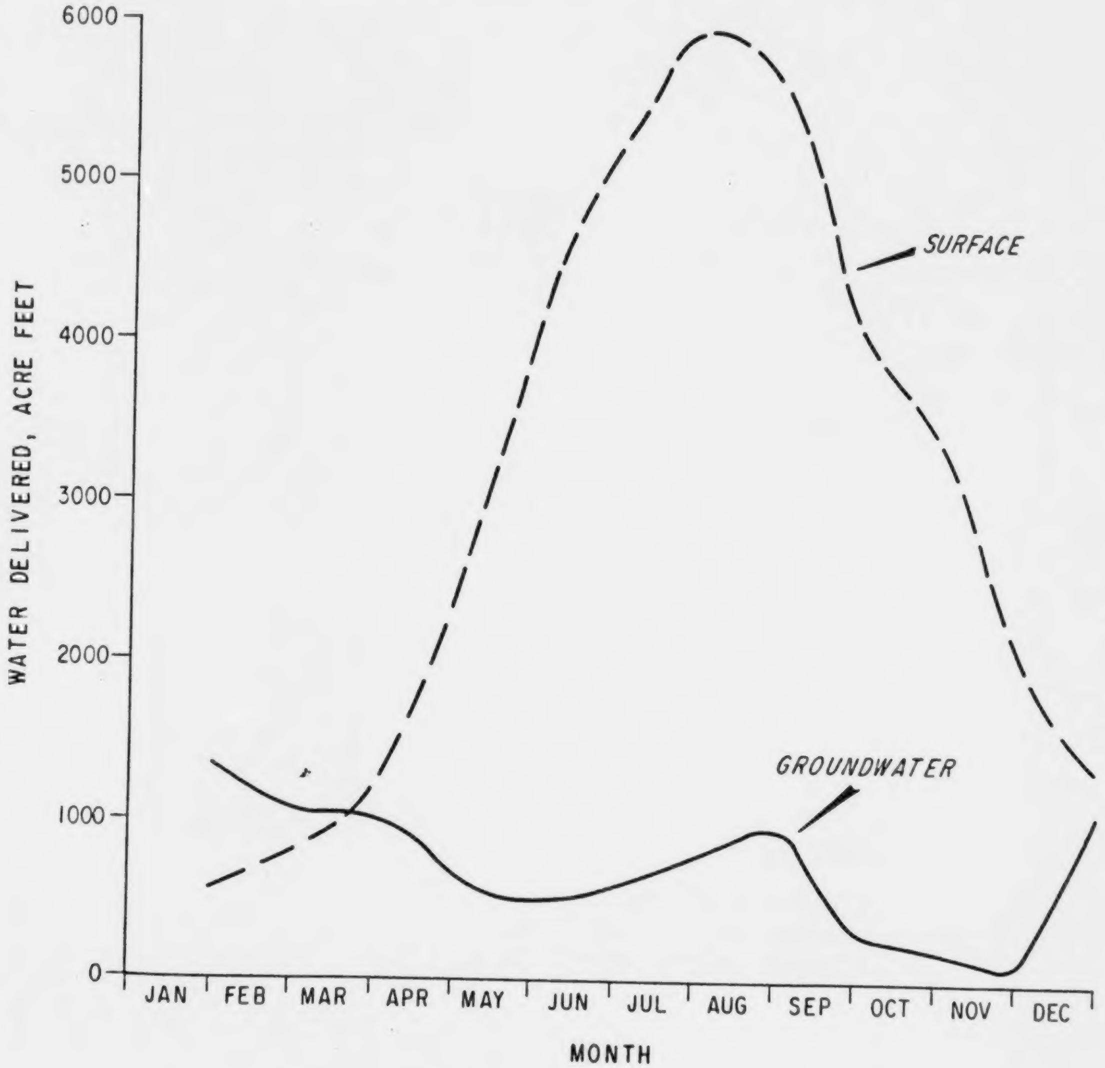


- LEGEND -

1. TRANS SIERRA WATER CO.
2. HIDDEN VALLEY WATER CO.
3. SIERRA PACIFIC POWER CO.

Figure E-10

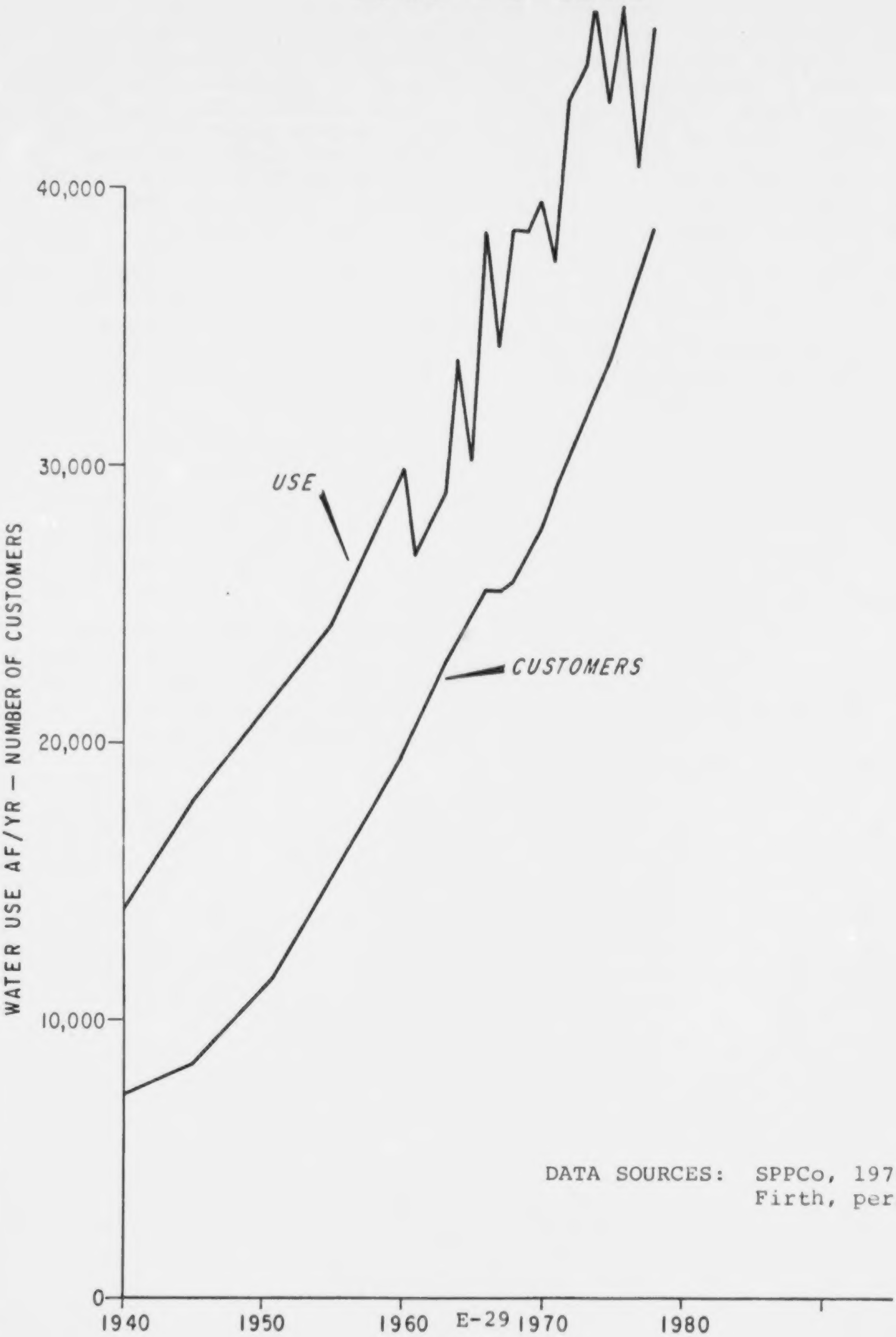
SURFACE WATER & GROUNDWATER PUMPAGE FOR THE SPPCo SYSTEM



DATA SOURCE: SPPCo records[4]

Figure E-11

SPPCo CUSTOMERS & WATER USE 1940 TO 1978



DATA SOURCES: SPPCo, 1976;
Firth, pers. comm.

It was estimated that during 1976 SPPCo was purchasing water rights at a rate of 900 acre-feet per year. However, this figure has reportedly not been achieved in recent years. Currently, SPPCo has 56,700 acre-feet of surface water rights (Firth, pers. comm.), made up of decreased and purchased rights. Most of the purchased water rights come from agricultural rights that are bought as agricultural land goes out of production or is converted to urban land. Also, SPPCo has expressed an interest in obtaining 17,000 acre-feet of water from Stampede Reservoir (Firth, pers. comm.).

In addition to the SPPCo system, there are currently a large number of small (less than 1,800 gpd) domestic wells serving individual households within the Truckee Meadows. It is estimated that as of April 1978, 5,541 persons lived within the Truckee Meadows but outside any water service boundary (DWP, 1978).

The per capita water use within Truckee Meadows varies significantly. It is, however, higher than levels generally found elsewhere. These higher levels are probably due to the hot, dry climate. Also, the large tourist use and the system being unmetered add to this high consumption. The average per capita water use for several of the water districts is given in Table E-10.

During the drought years in the early 1960s and 1977, voluntary water conservation was practiced within the Truckee Meadows. This program proved to be very successful, as seen in the reduced total use for those years found in Table E-8. In the future, water conservation may prove to be a way to accommodate an increasing population.

Table E-9

HISTORICAL WATER USE AND NUMBER OF CUSTOMERS IN THE SPPCo WATER SYSTEM

Year	Average Number of Customers	Percent Increase or Decrease	Total Use AF/yr.	Percent Increase or Decrease
1940	7,300		13,783	
1945	8,372	15	17,593	28
1950	11,598	39	21,006	20
1955	14,925	29	24,204	15
1960	19,302	29	29,770	23
1961	20,426	6	26,655	-10
1962	21,727	6	28,019	5
1963	22,850	5	28,944	3
1964	23,850	4	33,669	16
1965	24,626	3	30,122	-11
1966	25,437	3	38,342	27
1967	25,377	-.2	34,095	-11
1968	25,816	2	38,420	13
1969	27,089	5	38,241	-.4
1970	27,484	1	39,474	3
1971	28,982	5	37,401	-5
1972	30,427	5	43,007	15
1973	31,792	4	44,401	3
1974	32,868	3	46,279	4
1975	33,886	3	43,303	-6
1976	35,422	5	46,371	7
1977	36,924	4	40,694	-12
1978	38,446	4	45,633	12

DATA SOURCES: SPPCo, 1976; Firth, pers. comm.

Table E-10

WATER USE IN SELECTED LOCATIONS IN THE TRUCKEE MEADOWS AND CALIFORNIA

Location	Average Use Gallons/Capita/Day
Stead (1972)*	280
Hidden Valley (1978)***	282
Hidden Valley Condominiums*	170
Lemmon Valley*	165-175
SPPCo	360
San Bernardino**	226
Fresno**	326

DATA SOURCES:

* DWP, 1978;
** California Office of Planning and Research and Department of Water Resources, 1978;
*** Helseth, pers. comm.

HYDROLOGY APPENDIX

Footnotes

[1] Watermasters records, unpublished. Truckee River and diverted flows. Available from the federal watermasters office, P. O. Box 3571, Reno, Nevada.

[2] Reno-Sparks JWPCP records, unpublished. Effluent flows from the JWPCP. Available from the Reno-Sparks JWPCP, Sparks, Nevada.

[3] California Department of Water Resources records, unpublished. Evaporation rates for Lake Tahoe and Boca Reservoir. Available from the California Department of Water Resources, Sacramento, California.

[4] Sierra Pacific Power Company records, unpublished. Surface water and groundwater pumpage. Available from the Sierra Pacific Power Company, 100 E. Moana Lane, Reno, Nevada.

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RENO-SPARKS JOINT WATER POLLUTION CONTROL PLANT MASTER PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix F

Surface Water Quality

October 1980

Prepared for:

U. S. Environmental Protection Agency
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F-0

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ACRONYMS

BOD	biochemical oxygen demand
DO	dissolved oxygen
DOI	U. S. Department of the Interior
DRI	University of Nevada Desert Research Institute
EPA	U. S. Environmental Protection Agency
JWPCP	Reno-Sparks Joint Water Pollution Control Plant
M&I	municipal and industrial
MGD	million gallons per day
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
PEL	Pacific Environmental Laboratory
SPPCo	Sierra Pacific Power Company
TDS	total dissolved solids
TSD	?
USBR	U. S. Bureau of Reclamation (now called Water and Power Resources Service)
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey
WCOG	Washoe Council of Governments

F-Oe

SURFACE WATER QUALITY

Introduction

As the Truckee River changes from a fast-moving mountain stream to a slower-moving, flatland stream, the water quality of the river changes. Reduced river velocity, higher temperature, reduced dissolved oxygen and finer bottom sediments are associated with this change in slope. In addition, the river picks up dissolved minerals and other material from surface runoff, springs and tributaries. These additions lead to increases in the natural background levels of dissolved and suspended substances related to river flow and the nature of the watershed.

There are also inputs of pollutants which are related to land use and other activities of man. These extraneous inputs are typically associated with urban and agricultural runoff, sewage disposal, industrial effluent and other factors. In addition, water is diverted from the river for several uses, thus reducing the river's diluting ability.

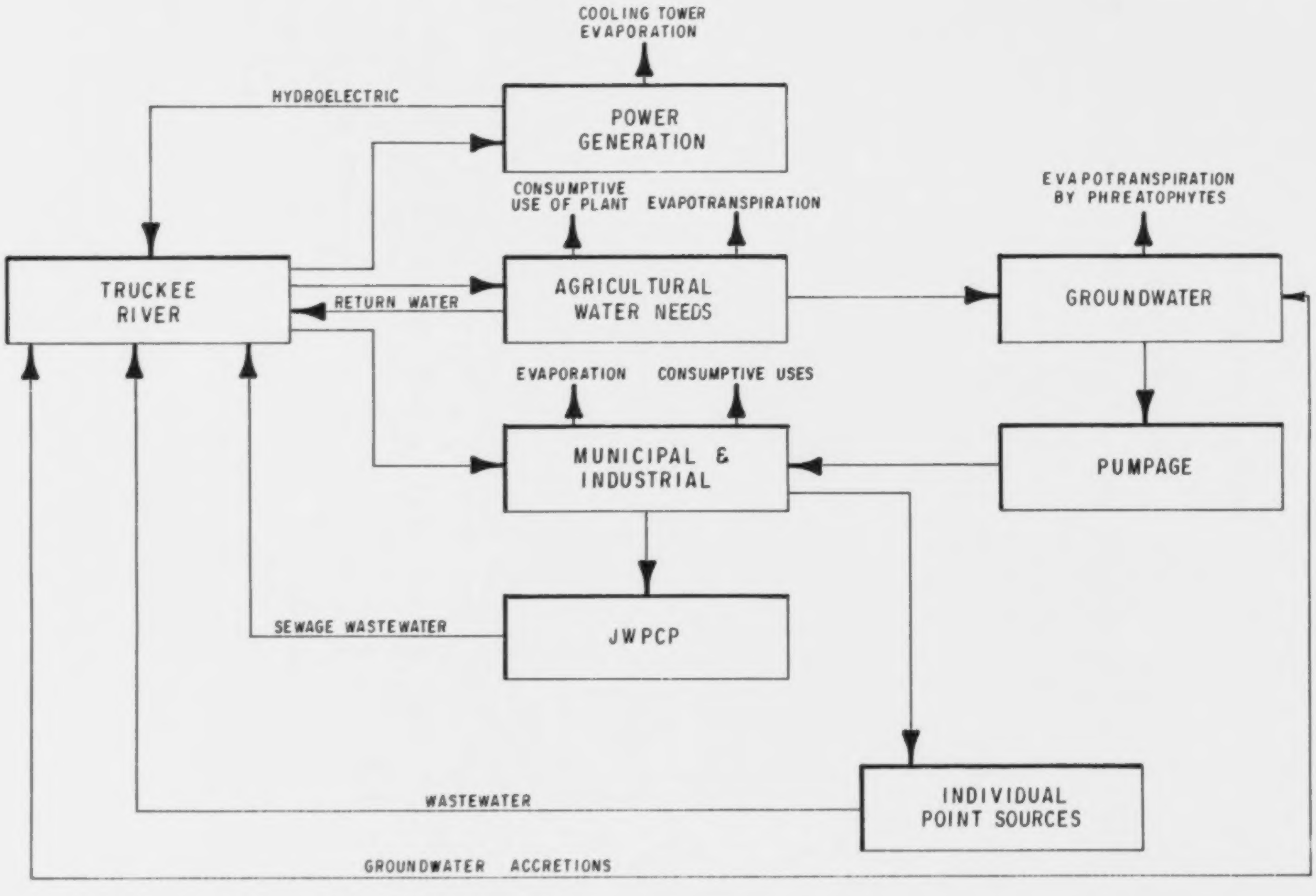
Currently, water is diverted for three purposes; power generation, municipal and industrial (M&I) uses, and agriculture. Water is diverted to drive hydroelectric turbines upstream of Reno and for use in the cooling towers of the Tracy fossil fuel generating plant (Figure F-1). The hydroelectric plant returns virtually the entire diverted flow to the river, while most of the cooling water from the Tracy power plant is eventually lost through evaporation in the cooling process.

M&I uses of water include industrial processes, domestic and commercial consumption, and landscape maintenance. While there are consumptive losses with all three uses, much of the water is returned to the river, although it may be changed in quality. A large portion of the water diverted for M&I uses is returned to the river via the Reno-Sparks Joint Water Pollution Control Plant (JWPCP). Additional return flows from M&I diversions reach the river in storm drains and drainage ditches as well as from groundwater.

Agricultural diversions are made at several places along the river through open irrigation ditches. Diverted water is applied to crops by flood irrigation. The irrigation water is either consumed by the plants, evaporated, percolated to the groundwater or returned to the river directly through

FIGURE F-1

SCHEMATIC DIAGRAM OF TRUCKEE RIVER WATER USES



Source: Jones & Stokes Associates, Inc.

the North Truckee Drain or Steamboat Creek. That portion which goes to groundwater is either pumped for surface use or slowly moves back to the river. Figure F-1 is a schematic diagram of the Truckee River system with diversions and returns.

Water Quality Standards

There are water quality standards for the Truckee River in both Nevada and California. These are presented in the text of the EIS.

Historical Water Quality

Historically, water quality in the Truckee River has varied. In the 1800s, lumber mills contributed large amounts of sawdust to the river which greatly degraded the water quality of the river and Pyramid Lake. By the late 1800s, a paper mill operating at Floriston was continuously discharging chemicals used in paper processing into the river. In addition, the City of Reno was dumping raw sewage into the river, combining to create a very degraded condition in the river. The paper mill ceased discharging pollutants in 1930 when the plant closed due to bankruptcy and the lumber mill ceased discharging sawdust soon after.

The river began to cleanse itself following the cessation of these polluting discharges and the construction of Reno's first sewage treatment plant in 1930, thus experiencing its cleanest period of the century between 1930 and 1945. Since 1945, however, the quality has again declined due to increased waste discharges associated with urban growth (Townley, pers. comm.).

Water Quality Studies

The water quality of the Truckee River has been studied by several private companies and governmental agencies during the past 20 years. These studies have ranged from short-term specific studies to long-term continuous monitoring. Past studies have looked not only at specific constituent concentrations but also at acute and chronic toxicity and algal growth formulation. A listing of the studies conducted on the Truckee River in Nevada is given in Table F-1.

The first four agencies listed in Table F-1 perform continuous monitoring of the Truckee River. The Desert Research Institute (DRI) and NDEP monitor water quality to check for exceedence of standards. The Reno-Sparks JWPCP has conducted a self-monitoring program of its effluent since it began operating in 1967. USGS has been monitoring water quality parameters since 1964 at three locations on the river

Table F-1

WATER QUALITY STUDIES OF THE TRUCKEE RIVER

Sponsor	Author	Program	Date
State of Nevada	Desert Research Institute	Water quality standards monitoring	1968-Date
State of Nevada	Nevada Division of Environmental Protection	Water quality standards monitoring	1966-Date
U. S. Geological Survey	U. S. Geological Survey	Water supply data	1964-Date
Reno-Sparks Joint Water Pollution Control Plant	Reno-Sparks Joint Water Pollution Control Plant	Monitoring of effluent	1967-Date
U. S. Environmental Protection Agency	U. S. Environmental Protection Agency	Water quality monitoring	Aug-Sept 1968 Mar-Apr 1977 Nov 1976
U. S. Public Health Service	U. S. Public Health Service	Water quality monitoring	1962, 1963
California Regional Water Quality Control Board	Kaiser Engineers	TTSA Project	Jul-Oct 1972
Washoe County 208 Program	URS Company		Jun-Sept 1977
U. S. Fish and Wildlife Service	U. S. Fish and Wildlife Service	Endangered, threatened species	Periodic since 1972
Dart Industries	McLaren Engineers	Upper basin law suits	Jul-Nov 1976
Reno and Sparks, EPA	Pacific Environmental Laboratories	Effect of JWPCP on river	1977-78

SOURCE: Jones & Stokes Associates, Inc.

as part of their water supply monitoring effort. In addition, several short-term water quality studies have been conducted:

- The WPRS collected chemical data between 1956 and 1959.
- Since 1962, the USFWS has periodically collected data to support their spawning studies.
- The U. S. Public Health Service completed a 16-day sampling program in 1962 and a 12-day program in 1963.
- In 1968, EPA completed a survey of water quality in the Truckee River system.
- In 1976 and 1977 the EPA Office of Enforcement set up in-situ monitoring and analysis stations to study permit conditions for the Tracy Power Plant and the Reno-Sparks JWPCP.
- In 1977, the EPA Region IX and the City of Reno authorized an intensive sampling program conducted by the PEL on the Truckee River to determine the impacts of the Reno-Sparks JWPCP.
- In 1977, the WCOG initiated a sampling program to study urban and agricultural return flows.
- In 1977, Dart Industries initiated a study of the Truckee River from Lake Tahoe to Vista to determine the impacts of the upper basin wastewater treatment facilities.
- From October 1977 to August 1978, Pacific Environmental Laboratory (PEL) conducted a study of the Truckee River and the Reno-Sparks JWPCP. The purpose of this study was to investigate the relationship between water quality of the Truckee River and discharges at the JWPCP.

The conclusions of the individual studies are discussed at length in PEL (1979). A numerical review of these various studies arranged according to sampling locations is given in Table F-2.

Existing Water Quality versus State Standards

Exceedence of state water quality standards has been detected in several of the water quality studies just mentioned. The relationship between standards and several quality constituents can be summarized as follows:

Table F-2

Truckee River Water Quality Data

Station	Date	Approx. River Mile(2)	Study(3)	Time	Flow (cfs)	Temp. (°C)	pH	Conductivity (µmhos/ cm)
Farad	07-11/76	-22	(McL)	-	-	14.2	8.2	-
	08-10/72		(K)	1215	529	13.8	7.8	90.3
	01-12/77		(NDEP)	0850-1145	-	1.2-17.5	7.5-8.1	-
Boynton Lane	08-09/68	- 2.9	(EPA)	2030-1735	-	18	-	116
	07-11/76		(McL)	-	-	14.3	8.6	-
	01-12/77		(NDEP)	1100-1330	-	2-22	7.6-9.2	-
Agric. Experi. Station	08-10/72	- 2.8	(K)	0700-1215	279	14.3	7.8	128.6
Steamboat Creek Above WPCP	08-09/68	- .2	(EPA)	2100-1755	-	22	-	333
	07-11/76		(McL)	-	-	12.2	7.8	-
	03-04/77		(NEIC)	diurnal ave.	20	7.7	7.2-9.1	-
	10/77-8/78		(PEL		-	3.5-23	7.4-7.9	-
Steamboat Creek Below WPCP	08-09/68	- 0.1	(EPA)	2115-1830	-	21	-	385
	07-11/76		(McL)	-	-	16.4	7.9	-
	10/77-8/78		(PEL)		-	10-23	7.5-8.0	-
Vista	08-09/68	1.2	(EPA)	1930-1525	385	-	-	220
	07-11/76		(McL)	-	553	16.2	7.8	-
	03-04/77		(NEIC)	diurnal ave.	330	7.4	7.0-8.8	-
	01-12/77		(NDEP)	1130-1430	244	2-23	7.4-8.1	-
	10/77-8/78		(PEL)		455	13.0	7.75	-
Lockwood	08-09/68	3.4	(EPA)	2000-1605	-	18	-	233
	03-04/77		(NEIC)	diurnal ave.	-	7.6	6.3-8.9	-
	10/76-9/77		(USGS)	1010-1415	385	1.0-23	7.3-8.7	258
Patrick	08-09/68	10.3	(EPA)	0835	-	15	-	240
	03-04/77		(NEIC)	diurnal ave.	-	7.8	6.7-8.3	-
Clark	08-09/68	15.2	(EPA)	1300-0930	-	19	-	243
	01-12/77		(NDEP)	1200-1500	236	2.8-27	7.8-8.9	-
	10/77-8/78		(PEL)		455	13.0	7.75	-
Truckee Canal Below Derby Dam	08-09/68	20	(EPA)	1030	312	19.5	-	260
Truckee River Below Derby Dam	08-09/68	20.5	(EPA)	1340-1105	52	20.5	-	245
	08-10/72		(K)	0815-1045	78	15.8	7.8	217
Wadsworth	08-09/68	30	(EPA)	1220	72	19.5	-	335
	08-10/72		(K)	0700-1010	83	14.7	7.8	258
	01-12/77		(NDEP)	1250-1600	36	2.8-25	7.5-8.6	-
	10/77-8/78		(PEL)		120	13.5	8.05	-
S-Bar-S Ranch	08-09/68	33.5	(EPA)	1400-1150	-	20.0	-	385
	08-10/72		(K)	0630-0945	87	15.2	7.9	417
6 Mi Above Nixon	10/76-9/77	46	(USGS)	1010-1200	69	4.5-22.5	8.0-9.0	640
Nixon	08-09/68	52	(EPA)	1500	76	-	-	475
Marble Bluff	10/77-8/78	2	(PEL)	1400-1600	120	13.5	8.50	-

Table F-2 (cont'd)

Station	Date	Total Dissolved Solids (mg/l)	Dissolved Oxygen (mg/l)	Biochemical Oxygen Demand 5-day (mg/l)	Total Phosphorus P (mg/l)	Total Phosphate P (mg/l)	Ortho-Phosphate P (mg/l)
Farad	07-11/76	76	8.8	2.2	-	.02	.01
	08-10/72	66	7.6	.7	-	.049	.03
	01-12/77	86	10.4	1.5	-	.07	.03
Boynton Lane	08-09/68	88	-	-	.04	-	.029
	07-11/76	77	9.7	-	-	.03	.02
	01-12/77	103	11.6	2.3	-	.029	≤.013
Agric. Experi. Station	08-10/72	97	8.3	1.1	-	.042	.039
Steamboat Creek Above WPCP	08-09/68	243	-	-	.285	-	.195
	07-11/76	181	8.1	-	-	.14	.11
	03-04/77	450	10.1	3.9	.36	-	-
	10/77-8/78	308	-	4.3	-	.28	.16
Steamboat Creek Below WPCP	08-09/68	280	-	-	2.65	-	≤2
	07-11/76	211	7.9	-	-	2.03	1.3
	10/77-8/78	322	-	18.7	-	2.8	3.1
Vista	08-09/68	160	-	-	.58	-	.52
	07-11/76	116	8.1	-	-	.33	.28
	03-04/77	-	10.3	3.0	.56	-	-
	01-12/77	203	9.0	4.8	-	.98	.92
	10/77-8/78	180	8.1	6.0	-	.91	.83
Lockwood	08-09/68	158	-	-	.62	-	.57
	03-04/77	-	10.1	3.2	.61	-	-
	10/76-9/77	158	7.9	-	.81	-	-
Patrick	08-09/68	170	-	-	.85	-	.817
	03-04/77	-	9.9	3.4	.56	-	-
Clark	08-09/68	155	-	-	.63	-	.574
	01-12/77	207	10.9	4.3	-	.90	.83
	10/77-8/78	184	8.5	3.7	-	.91	.76
Truckee Canal Below Derby Dam	08-09/68	145	-	-	.73	-	.64
Truckee River Below Derby Dam	08-09/68	158	-	-	.613	-	.545
	08-10/72	171	7.5	2.2	-	.46	.37
Wadsworth	08-09/68	195	-	-	.340	-	.327
	08-10/72	196	6.3	1.8	-	.47	.37
	01-12/77	228	10.7	3.3	-	.32	.30
	10/77-8/78	169	8.7	1.8	-	.26	.20
S-Bar-S Ranch	08-09/68	258	-	-	.298	-	.228
	08-10/72	291	6.7	1.7	-	.44	.31
6 Mi Above Nixon	10/76-9/77	316	-	-	.29	-	-
Nixon	08-09/68	325	-	-	.240	-	.160
Marble Bluff	10/77-8/78	401	9.4	2.2	-	.19	.06

Table F-2 (cont'd)

Station	Date	Total N (mg/l)	Ammonia (mg/l)	Un-ionized Ammonia N (mg/l)	Organic N (mg/l)	Nitrate N (mg/l)	Nitrate N Plus Nitrite N (mg/l)	Alka-linity (mg/l)	Hard-ness (mg/l)
Farad	07-11/76	.25	.02	-	.2	-	.06	-	-
	08-10/72	.176	.05	-	.137	.039	-	-	-
	01-12/77	-	.04	-	-	.15	-	46	-
Boynton Lane	08-09/68	-	<.15	-	.18	.03	-	-	17.5
	07-11/76	.39	.03	-	.26	-	.11	-	-
	01-12/77	-	≤.086	-	-	≤.13	-	55	-
Agric. Experi. Station	08-10/72	.321	<.05	-	.181	.140	-	-	-
Steamboat Creek Above WPCP	08-09/68	-	.27	-	.43	.23	-	-	34.8
	07-11/76	.61	.04	-	.50	-	.06	-	-
	03-04/77	-	.19	.01	1.10	-	.60	-	-
	10/77-8/78	1.2	.12	<.005	1.91	.16	.2	132	-
Steamboat Creek Below WPCP	08-09/68	-	5.3	-	35.8	.11	-	-	35.8
	07-11/76	5.05	8.12	-	1.88	-	.2	-	-
	10/77-8/78	11.7	7.82	.17	2.68	.64	.56	143	-
Vista	08-09/68	-	.82	-	.45	<.13	-	-	26.3
	07-11/76	1.56	.8	-	.77	-	.23	-	-
	03-04/77	-	1.02	.03	1.03	-	.66	-	-
	01-12/77	-	1.46	-	-	.34	-	102	-
	10/77-8/78	4.8	2.9	.05	-	.37	.53	94	-
Lockwood	08-09/68	-	.80	-	.45	.30	-	-	27.0
	03-04/77	-	1.06	.02	1.03	-	.88	-	-
	10/76-9/77	-	.98	-	.58	.52	.58	-	76
Patrick	08-09/68	2.1	.83	-	.36	.67	-	-	30.0
	03-04/77	-	.85	.01	1.11	-	1.3	-	-
Clark	08-09/68	-	.42	-	.77	.54	-	-	28.3
	01-12/77	-	.58	-	-	1.5	-	96	-
	10/77-8/78	4.2	1.0	.04	-	1.58	1.71	91	-
Truckee Canal Below Derby Dam	08-09/68	-	.37	-	.31	.62	-	-	29.5
Truckee River Below Derby Dam	08-09/68	-	.33	-	.57	.55	-	-	29
	08-10/72	1.25	<.05	-	.607	.639	-	-	-
Wadsworth	08-09/68	-	.23	-	.30	.34	-	-	38.5
	08-10/72	.25	<.05	-	.38	.368	-	-	-
	01-12/77	-	≤.19	-	-	.65	-	112	-
	10/77-8/78	1.8	.10	<.01	-	.31	.33	99	-
S-Bar-S Ranch	08-09/68	-	.18	-	.42	.23	-	-	50.3
	08-10/72	.78	<.05	-	.481	.295	-	-	-
6 Mi Above Nixon	10/76-9/77	1.1	.08	-	.67	.33	.34	-	138
Nixon	08-09/68	-	.10	-	.97	.05	-	-	57.5
Marble Bluff	10/78-8/78	1.7	.06	.01	-	.07	.07	110	-

Table F-2 (cont'd)

Station	Date	Bicar-bonate (mg/l)	Carbo-nate (mg/l)	Color	Turbidity (JTU)	Sodium (mg/l)	Potassium (mg/l)	Chloride (mg/l)	Boron (mg/l)
Farad	07-11/76	-	-	-	1.2	12.4	-	5.9	.19
	08-10/72	-	-	-	1.7	4.9	-	2.8	.11
	01-12/77	56	0	8	1.6	-	-	5.9	-
Boynton Lane	08-09/68	-	-	-	-	12.2	2.6	-	<.11
	07-11/76	-	-	-	-	-	-	3.6	.06
	01-12/77	62	1.8	9	1.9	-	-	5.6	-
Agric. Experi. Station	08-10/72	-	-	-	10.0	6.3	-	3.4	.11
Steamboat Creek Above WPCP	08-09/68	-	-	-	-	34.0	6.2	-	2.5
	07-11/76	-	-	-	-	-	-	17.8	-
	03-04/77	-	-	-	-	-	-	79	-
	10/77-8/78	-	-	-	22.3	56.7	8.5	49.8	-
Steamboat Creek Below WPCP	08-09/68	-	-	-	-	40.0	7.2	-	2.3
	07-11/76	-	-	-	-	-	-	23.8	.94
	10/77-8/78	-	-	-	16.3	62.0	11.1	47.7	-
Vista	08-09/68	-	-	-	-	18	3.3	-	.32
	07-11/76	-	-	-	-	-	-	8.6	.28
	03-04/77	-	-	-	-	-	-	-	-
	01-12/77	125	0	21	4.3	-	-	18.9	-
	10/77-8/78	-	-	-	9.9	26.8	5.0	20.5	-
Lockwood	08-09/68	-	-	-	-	12.3	3.5	-	.37
	03-04/77	-	-	-	-	-	-	-	-
	10/76-9/77	104	0	-	-	24	4.0	15	-
Patrick	08-09/68	-	-	-	-	20	3.9	-	.35
	03-04/77	-	-	-	-	-	-	-	-
	10/77-8/78								
Clark	08-09/68	-	-	-	-	18.8	3.8	-	.46
	01-12/77	111	2.7	26	4.3	-	-	19.2	-
	10/77-8/78	-	-	-	10.2	27.8	5.2	19.3	-
Truckee Canal Below Derby Dam	08-09/68	-	-	-	-	20	3.6	-	.44
Truckee River Below Derby Dam	08-09/68	-	-	-	-	19	3.7	-	.39
	08-10/72	-	-	-	20.7	-	-	10.0	-
Wadsworth	08-09/68	-	-	-	-	25.0	4.2	-	.42
	08-10/72	-	-	-	11.7	-	-	10.4	-
	01-12/77	128	3.3	26	2.8	-	-	18.7	-
	10/77-8/78	-	-	-	4.9	24.1	4.2	16.0	-
S-Bar-S Ranch	08-09/68	-	-	-	-	46	4.6	-	.46
	08-10/72	-	-	-	14.5	-	-	24.1	-
6 Mi Above Nixon	10/76-9/77	130	0	-	-	54	5.8	-	-
Nixon	08-09/68	-	-	-	-	49	1.9	-	.54
Marble Bluff	10/77-8/78	-	-	-	9.3	74.3	7.2	95.3	-

Table F-2 (cont'd)

Station	Date	Settleable Solids (mg/l)	Total Coliform (#/100ml)	Fecal Coliform (#/100ml)	Iron (mg/l)	Sulfate (mg/l)
Farad	07-11/76	-	200	4	.17	3.5
	08-10/72	-	254	3	-	-
	01-12/77	-	301	8	-	-
Boynton Lane	08-09/68	.12	-	-	-	-
	07-11/76	-	-	39	.23	5.8
	01-12/77	-	>525	≤72	-	-
Agric. Experi. Station	08-10/72	-	725	123	-	-
Steamboat Creek Above WPCP	08-09/68	.40	-	-	-	-
	07-11/76	-	2,400	-	.65	-
	03-04/77	-	-	-	-	-
	10/77-8/78	.28	-	-	1.44	36.7
Steamboat Creek Below WPCP	08-09/68	.40	-	-	-	-
	07-11/76	-	2,400	5,746	.5	24
	10/77-8/78	.50	-	-	1.12	44.6
Vista	08-09/68	.12	1,923	70	-	-
	07-11/76	-	-	1,531	.45	13.5
	03-04/77	-	-	-	-	-
	01-12/77	-	>605	≤81	-	-
	10/77-8/78	<.1	-	-	.87	23.3
Lockwood	08-09/68	.20	-	-	-	-
	03-04/77	-	-	-	-	-
	10/76-9/77	-	2,227	<1,078	503	21
Patrick	08-09/68	-	-	-	-	-
	03-04/77	-	-	-	-	-
Clark	08-09/68	.2	-	-	-	-
	01-12/77	-	1,327	≤35	-	-
	10/77-8/78	.1	-	-	.94	26.1
Truckee Canal Below Derby Dam	08-09/68	-	-	-	-	-
Truckee River Below Derby Dam	08-09/68	.1	-	-	-	-
	08-10/72	-	155	65	-	-
Wadsworth	08-09/68	-	-	-	-	-
	08-10/72	-	670	76	-	-
	01-12/77	-	578	≤90	-	-
	10/77-8/78	<.1	-	-	.41	20.9
S-Bar-S Ranch	08-09/68	.10	-	-	-	-
	08-10/72	-	595	35	-	-
6 Mi Above Nixon	10/76-9/77	-	-	-	-	-
Nixon	08-09/68	.01	-	-	-	-
Marble Bluff	10/77-8/78	<.1	-	-	.64	86.3

Table F-2 (cont'd)

(1) Average of values obtained during study.

(2) Steamboat Creek-Truckee River confluence = 0.00 River Mile. Negative River Miles indicate distance upstream of Steamboat Creek-Truckee River confluence.

(3) EPA - Environmental Protection Agency; McL - McLaren; NDEP - Nevada Department of Environmental Protection; NEIC - National Enforcement Investigations Center; USGS - U. S. Geological Survey; K - Kaiser Engineers; PEL - Pacific Environmental Laboratory.

DATA SOURCE: PEL, 1979.

Temperature. The state standards for temperature have been exceeded several times, especially below Derby Dam (Rowell, 1975). Elevated temperatures in the lower river are caused primarily by reduced river flow and a loss of the vegetative cover for the river.

Dissolved Oxygen (DO). Dissolved oxygen levels in the river have occasionally been below state standards (Kaiser, 1973; WCOG, 1978). Generally, depressed DO concentrations are caused by the high respiration demand of algal activity. WCOG (1978) reports diurnal variations in dissolved oxygen of 3 to 4 mg/l.

Biochemical Oxygen Demand (BOD). BOD is generally within state standards. The highest concentrations are usually found below the JWPCP, as the plant discharge is the primary source of BOD to the river.

Nutrients. Historically, the state standard for total phosphate has been exceeded at most points in the river below Steamboat Creek (Kaiser, 1973; NDEP records[1]). This is primarily due to the influence of the JWPCP (WCOG, 1978).

Nitrates have shown an increasing trend from Steamboat Creek downstream. PEL (1979) found occasional exceedences of the nitrate standard above Derby Dam. DRI found exceedences of the nitrate standard above and immediately below Derby Dam during the fall of 1977. Generally, however, the standard below Derby Dam is met.

Total Dissolved Solids (TDS). TDS levels exceeding state standards have been measured at several locations on the river (Kaiser, 1973; PEL, 1979). Steamboat Creek and the North Truckee Drain are the major sources of dissolved solids.

There have been occasional exceedences of chloride standards (DRI records[2]). Exceedences were especially noted during the low flow period of 1977.

Other water quality parameters having standards generally appear in concentrations that meet those standards.

Existing Wastewater Discharges to the River

Wastewater is directly or indirectly discharged to the Truckee River in both California and Nevada. From the outlet at Lake Tahoe to the state line, the river receives waste discharges from urban runoff, agricultural return flows, septic tank leakage, runoff from golf course irrigation and seepage from the land disposal of the TTSA wastewater treatment plant effluent (Davis, pers. comm.). Within the growing Truckee area a need for greater wastewater treatment capacity has been expressed. From Stateline to Pyramid Lake, there are several point discharges to the river. About 14 of these are cooling water discharges from hotel/casino air conditioning systems in the Truckee Meadows (WCOG, 1978). These discharges, though they contribute limited amounts of pollutants, are required to have discharge permits issued by the state. Several larger point sources that discharge to the river are discussed below.

Reno-Sparks JWPCP. The largest wastewater discharger to the river on a yearly basis is the Reno-Sparks JWPCP. The plant, located at the confluence of Steamboat Creek and the Truckee River, discharges into the creek just above the confluence with the Truckee River. The plant has discharged between 14 and 21 MGD on an average monthly basis. Currently the plant is discharging about 20 MGD.

At times the treatment plant operates in an overloaded condition, not only with respect to the physical design capacity but also in relation to biological design capacity (PEL, 1979). Overload has caused some problems with meeting effluent limitations. During an overload condition, PEL (1979) found nitrogenous BOD showing up in the 5-day BODs. In fact, it was determined that this represented 60 to 70 percent of the total 5-day BOD. Exceedence of BOD, total suspended solids and fecal coliform standards were also detected during this same overload condition (EPA, 1977).

PEL (1979) found the major toxicants discharged from the plant to be: residual chlorine, ammonia, nitrate and nitrite. Chlorine toxicity will be abated through the installation of a dechlorination system in the ESP. Toxicity problems related to nitrogen compounds will be abated by the Master Project through nitrogen removal.

The effluent from the plant undergoes post aeration and is discharged to Steamboat Creek. A visible plume of poor quality water is formed at the confluence of Steamboat Creek and the river. This plume, often composed of high concentrations of relatively undiluted effluent, may extend across the river forming a degraded water quality barrier. The size of this barrier is directly related to flow in the Truckee River at the confluence.

The effluent mixes with the river within the first 1,200 meters of the confluence (EPA, 1977; PEL, 1979). Immediately below the point of discharge, a zone of degradation exists due to the relatively undiluted effluent. High levels of BOD, total phosphorus and total nitrogen are present in addition to toxic levels of many constituents. Further downstream pollutant concentrations are high, but due to dilution and mixing, extreme levels found immediately below the confluence are no longer present. Concentrations measured below the sewage outfall in Steamboat Creek and in the Truckee River between Steamboat Creek and Vista, are shown in Table F-3. It is evident from this table that concentrations are high immediately below the outfall and decrease down to Vista.

Steamboat Creek - North Truckee Drain. Steamboat Creek, a natural stream located on the south side of the Truckee River, and the North Truckee Drain, an agricultural drain located on the north side of the river, provide drainage for a majority of the Truckee Meadows agricultural land and some urban land. Both discharge to the Truckee River near the eastern edge of the Truckee Meadows.

During the irrigation season both systems collect agricultural return water from surface and subsurface flow. In addition, both receive discharges from urban and industrial surface runoff. Steamboat Creek also receives pollutant loads from Washoe Valley and Steamboat Springs, a thermal springs area near the confluence of Steamboat Canal and Steamboat Creek.

The North Truckee Drain receives pollutant inputs from the Orr Ditch, which are generated in the northwestern area of Reno from agricultural and urban land uses. Agricultural return flows from Spanish Springs Valley and eastern Sparks as well as from Spanish Springs contribute pollutant loads to the drain. Agricultural return water from lands within Spanish Springs Valley and eastern Sparks also contributes flows to the North Truckee Drain.

Truckee River below Vista. Below Vista irrigation water is returned to the river at several locations along this reach. The SPPCo operates a fossil fuel power plant at Tracy which removes water from the river for cooling. However, since 1977 the cooling process has been a closed system without any water being returned to the river. The SPPCo maintains a NPDES permit for discharge to the river although it is not used (Sullivan, pers. comm.).

Below Derby Dam water enters the river from several springs and marsh areas. Many of these springs began to flow about 10 years after irrigation was begun on the benchlands (Crowe, pers. comm.). River water also returns to the river as spill-back from the Truckee Canal and as subsurface flow from the Truckee Division of the Newlands Project (Appendix E).

Table F-3

WATER QUALITY CONDITIONS* BELOW STEAMBOAT CREEK
DURING 1977

	NH_3	NO_3	NO_2	Org-N	Total-N	BOD	Total-P	PO_4-P
Below JWPCP in Steamboat Creek	7.82	.64	1.2	2.83	9.78	18.7	2.83	2.52
Below Steamboat Creek	3.47	.42	.65	1.73	6.25	8.4	1.22	1.2
First Riffle	2.97	.42	.55	1.26	5.20	6.1	1.04	.81
Vista	2.78	.37	.16	1.36	4.80	6.0	.91	.83

DATA SOURCE: PEL, 1979.

*Concentrations in mg/l.

Existing Water Quality

As cited earlier, the quality of the Truckee River varies considerably from Lake Tahoe to Pyramid Lake. From a water quality standpoint, the river can be divided into four sections discussed below.

Lake Tahoe to Stateline

The major wastewater input within this section is the TTSA tertiary wastewater treatment plant. This plant utilizes subsurface discharge of the effluent, which percolates through the ground and discharges at Martis Creek and the Truckee River. Nutrients also enter the river via seepage from the land disposal sites of the inactive secondary wastewater treatment plants in the Truckee area (Davis, pers. comm.). Urban runoff and septic tank seepage also contribute pollutants to the river.

Studies show that the section of river above Stateline (including above Reno) exhibits a high level of water quality (PEL, 1979; Kaiser, 1973; McLaren, 1977).

Consideration is being given to reopening several secondary wastewater treatment plants above Truckee (mentioned above) in order to increase the total wastewater treatment capacity of the area. These plants use land application for effluent disposal. However, the effluent would return to the river via groundwater. One study found that while it was operating, the TTSA secondary wastewater treatment plant did not have any measurable effect upon the quality of the Truckee River (McLaren, 1977). Other studies (Kaiser, 1973), have found that discharges between Tahoe City and Truckee and leachates from TTSA influence Truckee River water quality. There is currently some concern that the reopening of these plants could adversely affect the quality of the Truckee River (Davis, pers. comm.). Also, Truckee River water quality standards in California have been relaxed pending EPA concurrence. Relaxation of these standards could lead to a greater pollutant load to the California reach of the river. If waste loading increases, water quality at Stateline could be significantly affected.

Historical data (Table F-2), show the California section of the river to have very good quality water. The concentrations of nutrients, TDS, and turbidity are low. In addition, the macrophytes, periphyton and macroinvertebrates found by McLaren and Kaiser in this section show high diversity and species which are relatively intolerant to pollution.

Stateline to Vista

Studies have found that significant water quality degradation begins downstream of Reno (PEL, 1979; Kaiser, 1973). This degradation results mainly from pollutants originating from urban and agricultural land uses. This pollution is in addition to the natural changes that occur as the river widens and slows on its passage through the Truckee Meadows. Within this reach, the increase in water temperature becomes important to the condition of the river. In a temperature study of the river, Rowell (1975) found that the diversion and returning of water with higher temperatures was the principal cause of thermal problems in the Reno area. The temperature effect was increased following channelization and removal of riparian vegetation along the river from Reno to Pyramid Lake. This work was performed in the early 1960s by the U. S. Army Corps of Engineers to mitigate floods in the Reno area (DOI, 1977).

The degradation of river quality is characterized by, among other things, a nutrient enrichment of the algae (periphyton) populations through the Truckee Meadows. This change is demonstrated by increasing biomass and abundance with a relatively unchanging diversity (PEL, 1979). In addition, the algal species present are relatively more tolerant of pollution than those found at Verdi.

Below Reno the degraded condition exists due mainly to pollutants entering the river from the North Truckee Drain, Steamboat Creek and the JWPCP. EPA (1977) found the majority of BOD, TDS, and chlorine detected at Vista came from these sources. In fact, the majority of BOD, total phosphorus, and total nitrogen detected at Vista came from the JWPCP. PEL (1979) found that the area immediately below Steamboat Creek exhibited a mild toxicity to the aquatic life present.

As seen in Table F-2, concentrations of most constituents increased from the sampling stations above the Truckee Meadows to Vista. A large portion of these pollutant loads come from the JWPCP, as seen by the high concentration of pollutants in Steamboat Creek below the JWPCP. Pollutant loads in Steamboat Creek upstream of the JWPCP, however, are also much higher than levels found at locations in the river above Steamboat Creek. These higher levels are due to agricultural and urban return flows and high background levels from Washoe Lake and Steamboat Springs (Table F-4). In Spanish Springs Valley, Spanish Springs discharges to the North Truckee Drain and eventually to the Truckee River with effects similar to those of Steamboat Springs.

DRI data offer one additional data point on the North Truckee Drain not included in PEL data. Use of DRI data allows a more complete understanding of the sources of pollutant

Table F-4

ESTIMATED DAILY PARAMETER LOADS FROM SPANISH AND STEAMBOAT SPRINGS
(lbs/day Except Flow)

	Spanish Springs	Steamboat Springs
Flow (cfs)	1.5 (est.)	Less than 1 cfs (est.)
Dissolved Solids	1,232	16,949
Suspended Solids	0	0
Settleable Solids	0	0
BOD	-	0.24
Total Phosphorus	0.16	6.21
Dissolved Phosphorus	0.16	6.21
Nitrate	13.4	0.24
Kjeldahl Nitrogen	-	-
Fecal Coliforms	35×10^6 Org/Day	22×10^6 Org/Day

DATA SOURCE: URS Company, 1977.

loading in the Truckee Meadows. The DRI data are therefore presented herein as supplemental to PEL data, and are the basis of the "arrow" charts that show loading in the Truckee Meadows.

The historical mass loading in this reach as shown by the DRI data and the USGS is shown in Table F-5. The loading was computed by multiplying the concentration measured by DRI by the average daily flow measured by the USGS (or the watermaster in the case of Steamboat Creek or North Truckee Drain). This loading was used to illustrate the mass loading in Figures F-2 through F-8.

Vista to Derby Dam

This reach of the river flows through the Truckee Corridor to Derby Dam. There are 18 diversions along this reach.

Below Vista, the effects of high nutrient loadings and increased temperatures from the JWPCP and drainage are readily apparent. A zone of biostimulation has been identified between Vista and Clark (PEL, 1979; Kaiser, 1973). This condition is demonstrated by increased chlorophyll-a concentrations and a greater abundance and biomass of periphyton. Macroinvertebrate populations also increase below Vista and Peaks at Clark, while the species present generally have a high tolerance to organic enrichment. Species diversity in this section is low and the species composition is quite different from the species found above Reno (PEL, 1979; Kaiser, 1973; EPA, 1971).

Historically, separate studies have shown an overall decrease in concentrations of many dissolved substances, especially nutrients, between Vista and Derby Dam. This apparent cleansing of the water occurs due to the uptake and storage of nutrients by aquatic plants and invertebrates. In addition to plant and animal uptake, constituents adsorb to particulate matter and settle out within this reach, especially during the low flow periods of summer and fall (PEL, 1979). The nutrients stored in the bottom sediments and in plant and animal tissue are available to enter the river and thus Pyramid Lake and Lahontan Reservoir during flows that scour the river bed.

Diurnal variations in DO and pH can, at times, be significant in this reach of the river (PEL, 1979; Kaiser, 1973). The largest variations occur during the warmer months when photosynthesis and respiration are occurring at their highest rates. During these times, DO decreased below the river standard of 6.5 mg/l and the pH showed significant variations

Table F-5. Historical Seasonal Constituent Load for the Truckee River
(lbs/day[2])

	Reno	Steamboat Creek	North Truckee Drain	Historical JWPCP
Nitrate (NO_3-N)				
W	307	50	68	162
S	126	27	70	
Nitrite (NO_2-N)				
W	*	2	16[1]	243
S	*	3	16	
Ammonia (NH_4-N)				
W	79	17	80[1]	2,587
S	56	16	80	
Total Organic Nitrogen				
W	634	156	93[1]	485
S	603	245	93	
Total Phosphate (TP-N)				
W	91	51	14[1]	970
S	98	72	14	
Ortho Phosphate (PO_4-P)				
W	53	42	14	731
S	71	49	17	
Total Dissolved Solids[2] (TDS)				
W	129[2]	52	30	28
S	131	40	34	
Chloride				
W	13,910	15,850	2,400	5,500
S	11,120	14,870	2,020	

Legend
S - June through October
W - November through May
* - Less than detectable limit

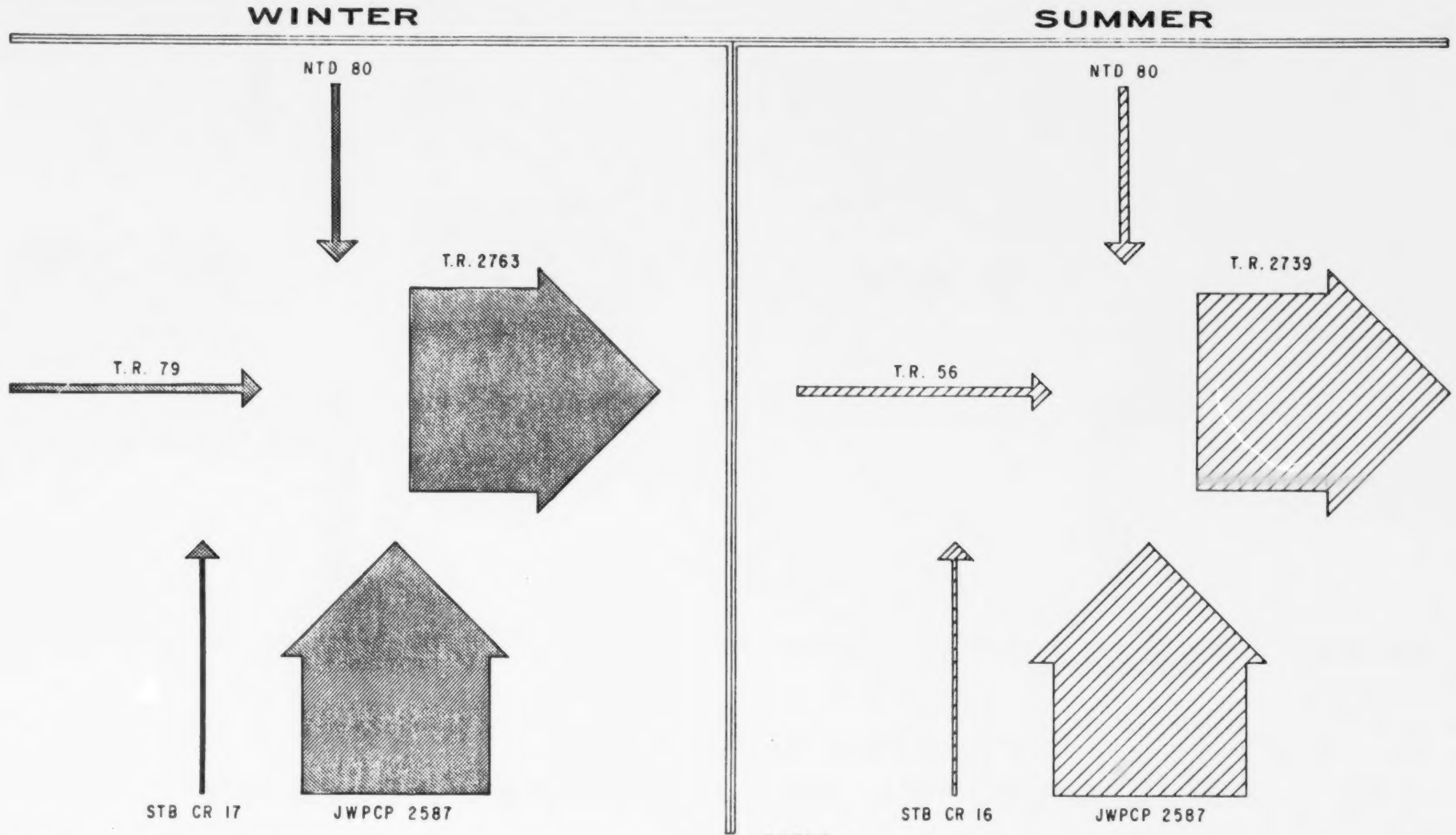
[1] Estimated from data collected by EPA, 1977.
[2] TDS is tons/day

SOURCE: Data adapted from DRI data.

Figure F-2

AMMONIA LOADING TO THE TRUCKEE RIVER

IN THE STATELINE TO VISTA REACH

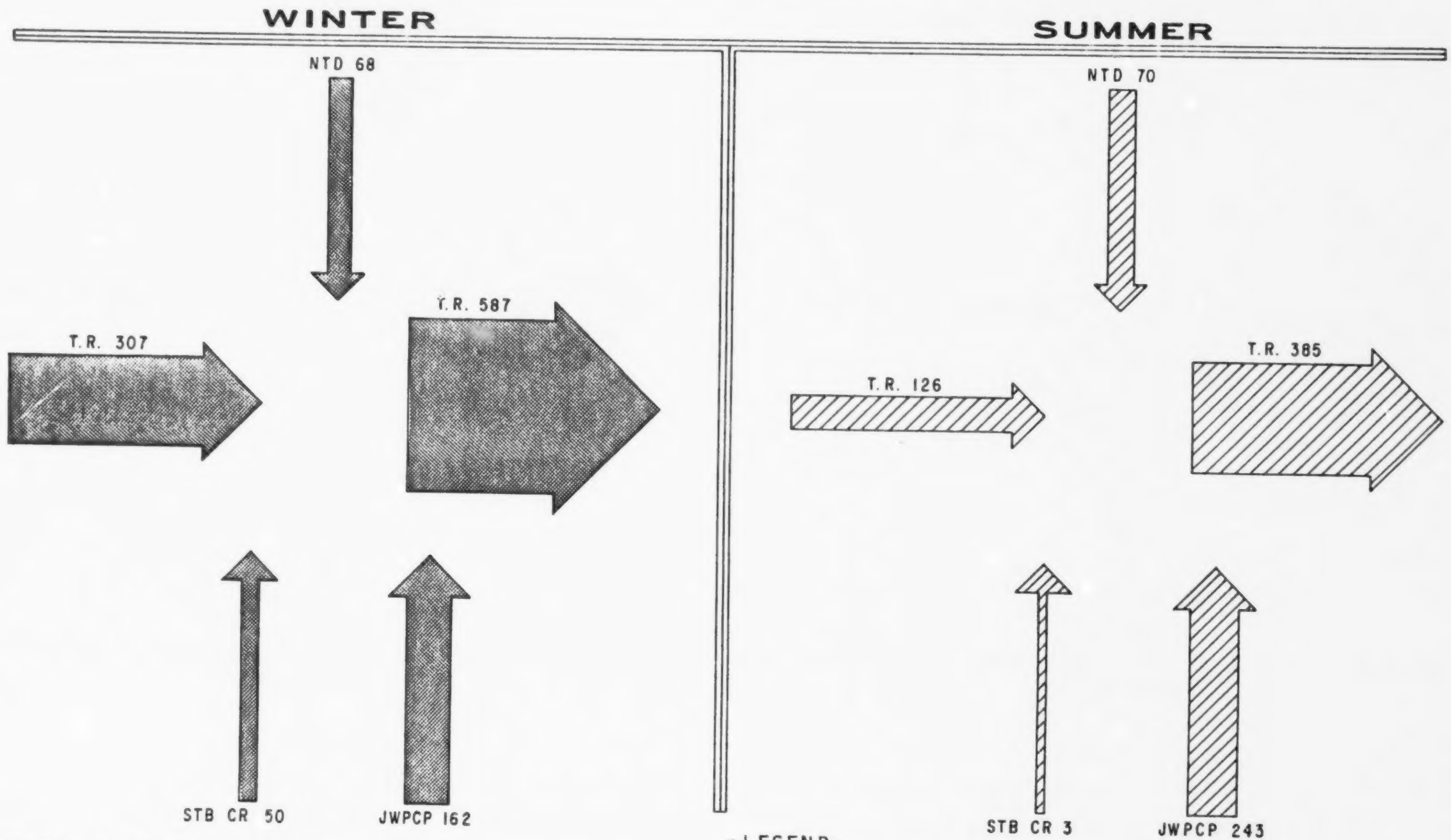


SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

-LEGEND-
NTD-NORTH TRUCKEE DRAIN
STB CR-STEAMBOAT CREEK
T.R.-TRUCKEE RIVER
NUMBERS INDICATE LBS. PER DAY

Figure F-3

NITRATE LOADING TO THE TRUCKEE RIVER
IN THE STATELINE TO VISTA REACH

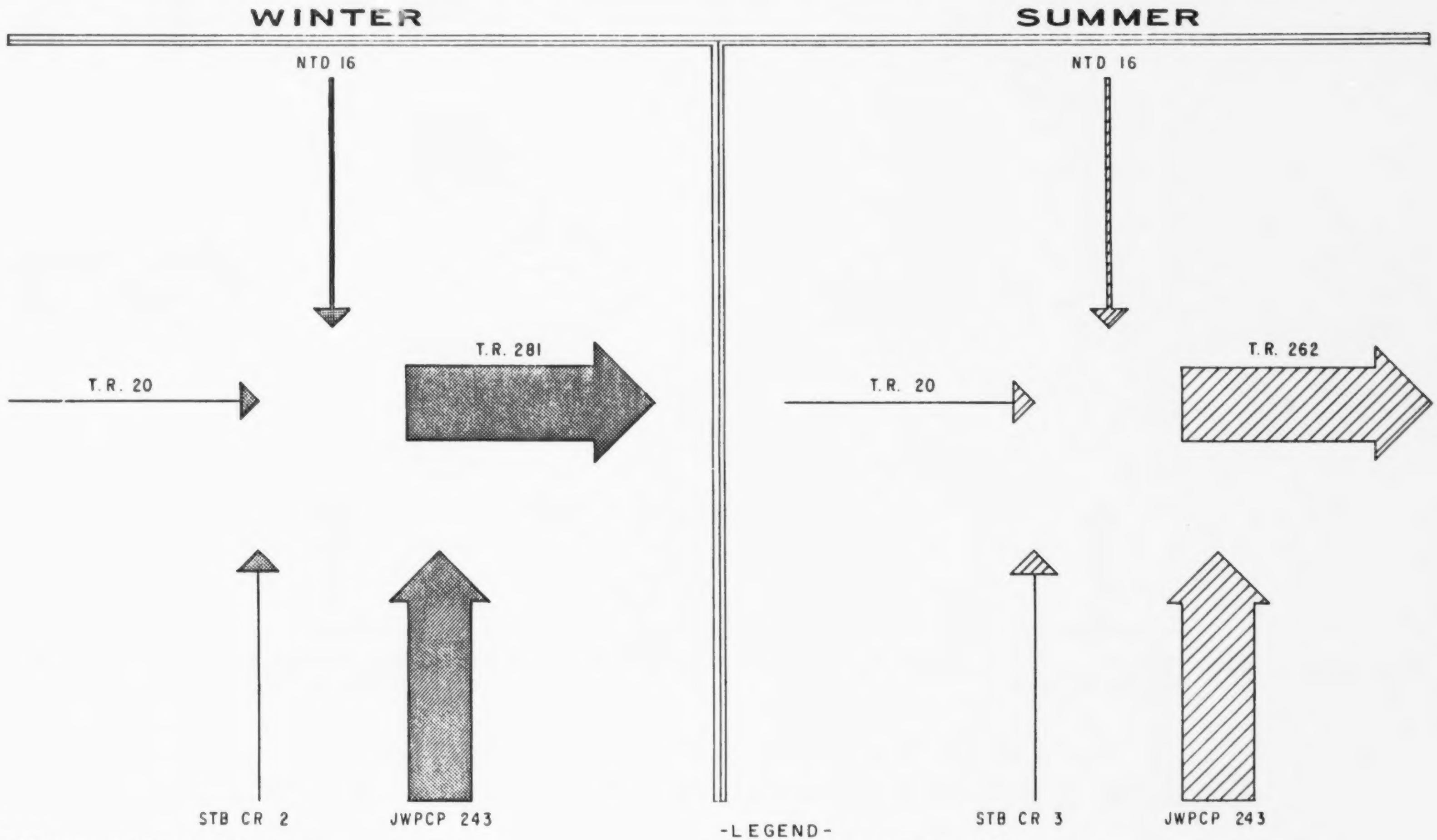


SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

-LEGEND-
NTD-NORTH TRUCKEE DRAIN
STB CR-STEAMBOAT CREEK
T.R.-TRUCKEE RIVER
NUMBERS INDICATE LBS. PER DAY

Figure F-4

NITRITE LOADING TO THE TRUCKEE RIVER
IN THE STATELINE TO VISTA REACH



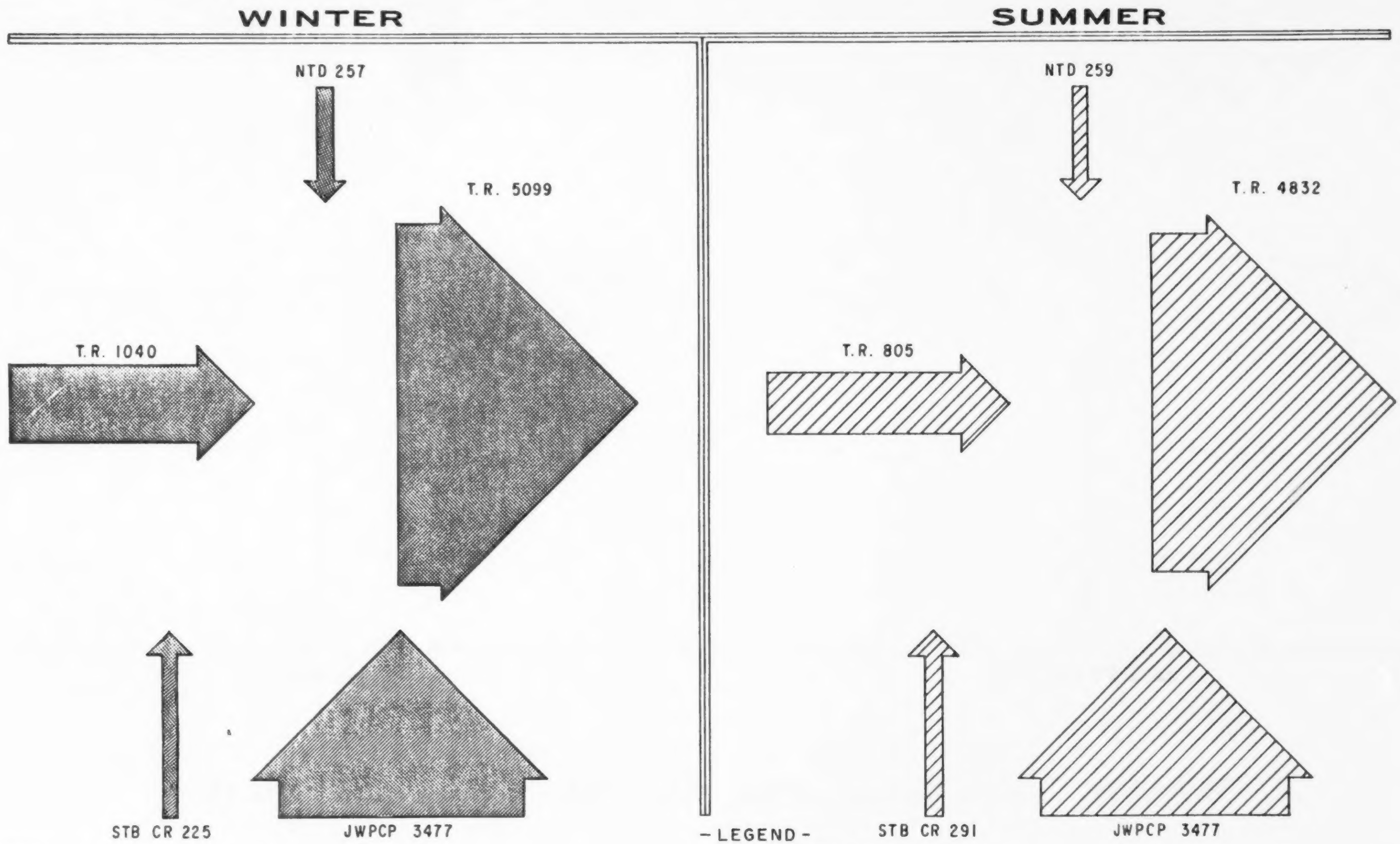
SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

-LEGEND-
NTD - NORTH TRUCKEE DRAIN
STB CR - STEAMBOAT CREEK
T.R. - TRUCKEE RIVER
NUMBERS INDICATE LBS. PER DAY

Figure F-5

TOTAL N LOADING TO THE TRUCKEE RIVER

IN THE STATELINE TO VISTA REACH

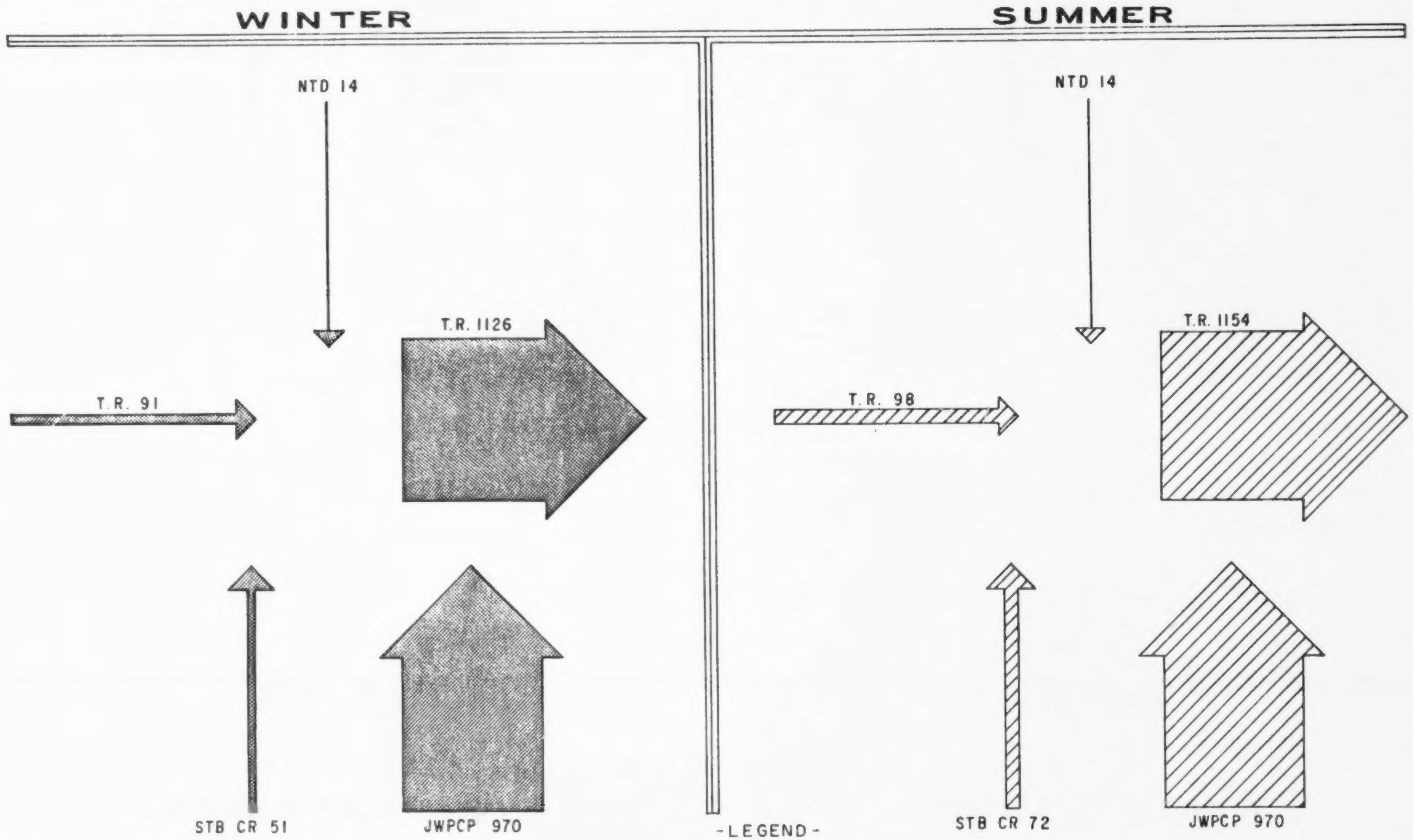


SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

- LEGEND -
NTD - NORTH TRUCKEE DRAIN
STB CR - STEAMBOAT CREEK
T.R. - TRUCKEE RIVER
NUMBERS INDICATE LBS. PER DAY

Figure F-6

TOTAL P LOADING TO THE TRUCKEE RIVER
IN THE STATELINE TO VISTA REACH

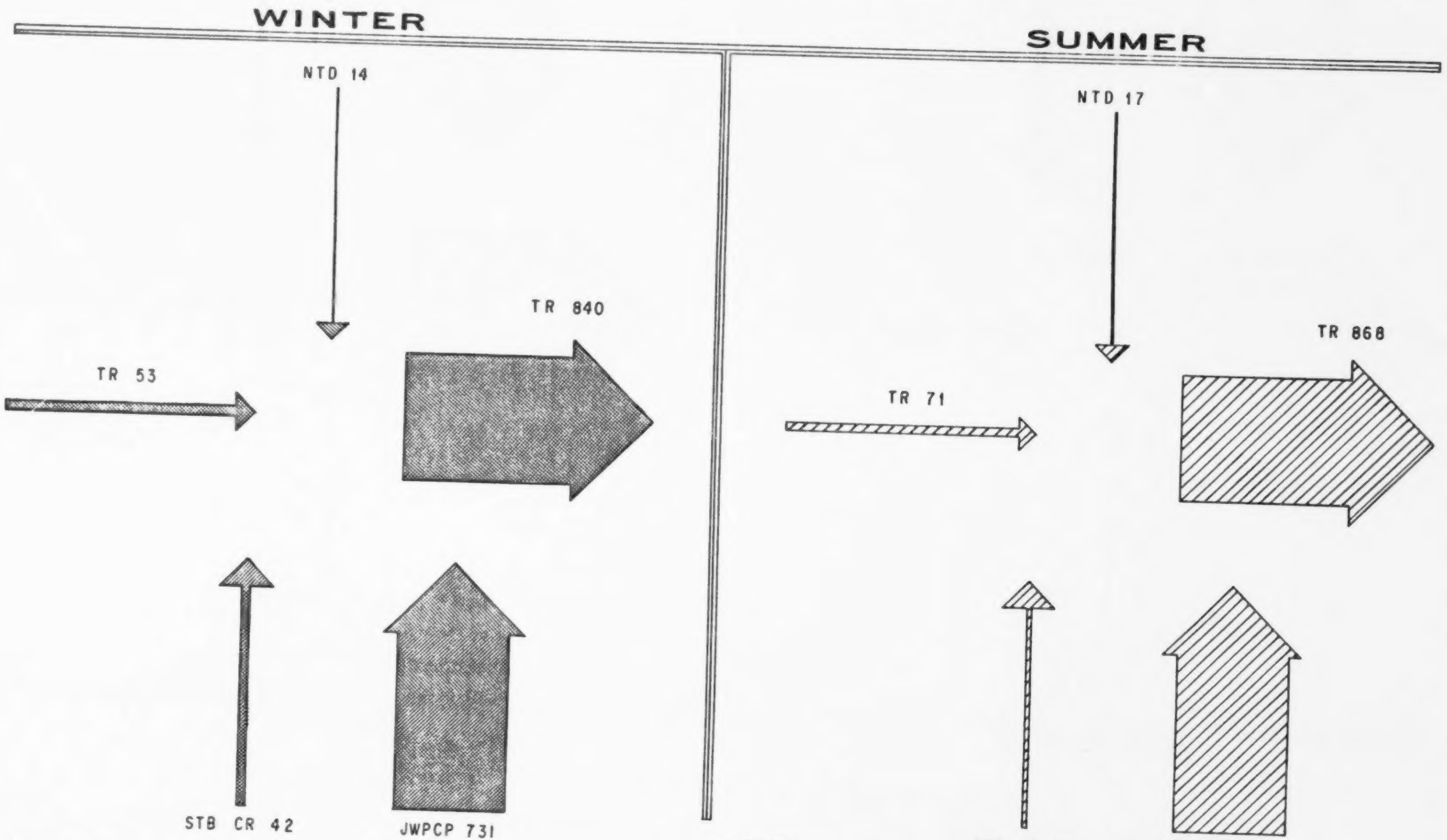


-LEGEND-
NTD - NORTH TRUCKEE DRAIN
STB CR - STEAMBOAT CREEK
T.R. - TRUCKEE RIVER
NUMBERS INDICATE LBS PER DAY

SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

Figure F-7

PHOSPHATE LOADING TO THE TRUCKEE RIVER
IN THE STATELINE TO VISTA REACH

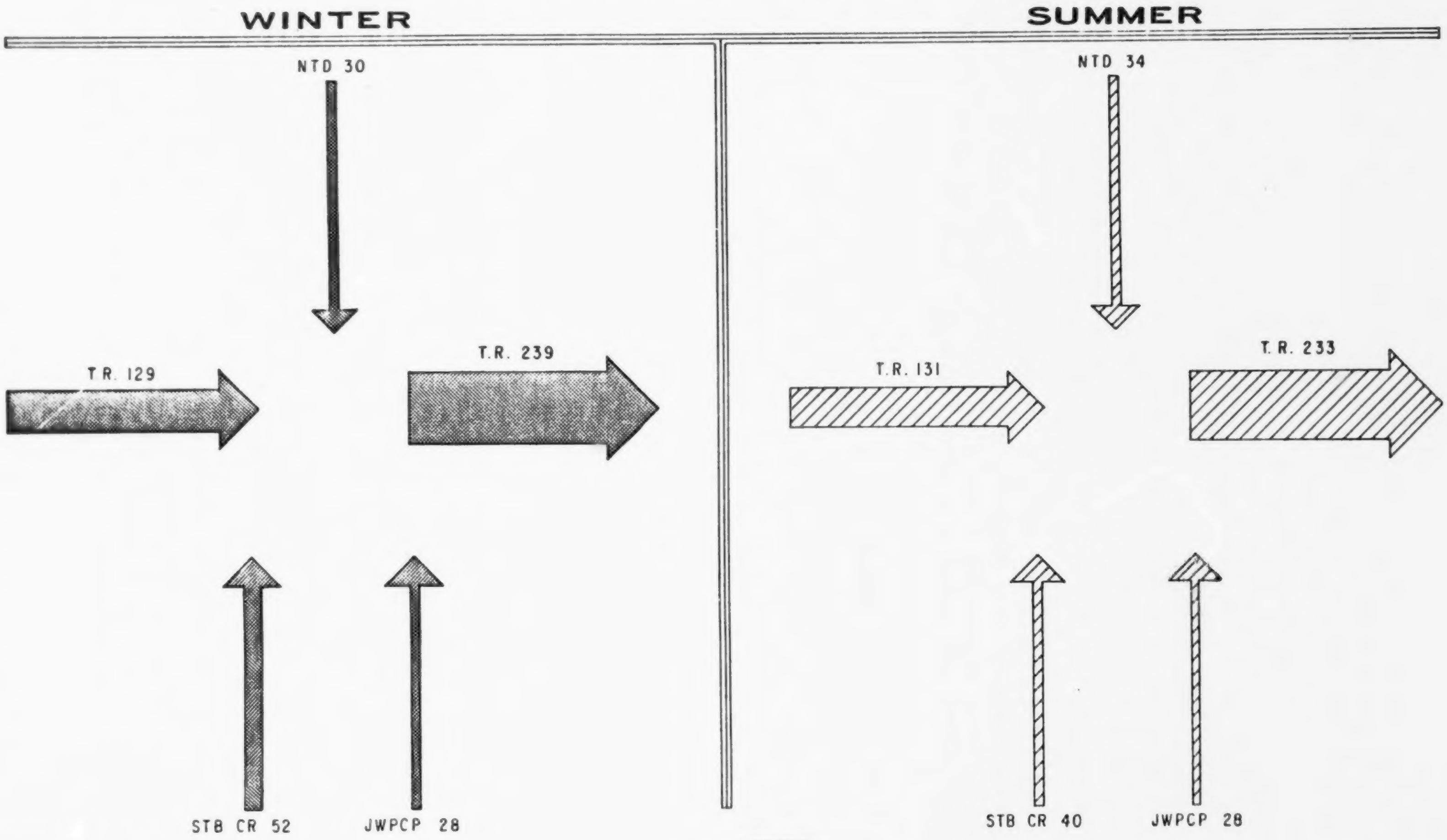


SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

-LEGEND-
NTD - NORTH TRUCKEE DRAIN
STB CR - STEAMBOAT CREEK
T.R. - TRUCKEE RIVER
NUMBERS INDICATE LBS. PER DAY

Figure F-8

TOTAL DISSOLVED SOLIDS LOADING TO THE TRUCKEE RIVER
IN THE STATELINE TO VISTA REACH



SOURCES: DRI UNPUBLISHED DATA
KENNEDY/JENKS ENGINEERS, 1979
JONES & STOKES ASSOCIATES, INC.

-LEGEND-
NTD - NORTH TRUCKEE DRAIN
STB CR - STEAMBOAT CREEK
T.R. - TRUCKEE RIVER
NUMBERS INDICATE TONS PER DAY

(PEL, 1979). PEL (1979) also found that the low DO concentrations at Lockwood, Patrick and Clark coincided with high periphytic growth.

The SPPCo operates a fossil fuel power plant at Tracy. Water is diverted from the river for cooling purposes, but since 1977 the cooling system has been a closed process, with water being diverted only for evaporation make-up water (Sullivan, pers. comm.). Cooling water from the cooling towers is discharged to a 30 acre pond, which is then drawn upon for new cooling water. The SPPCo has a NPDES permit to discharge cooling water but currently does not discharge directly to the river. Since the ponds are unlined, there is probably some seepage to the river although this has not been documented. This seepage may have a high TDS level since salts are usually concentrated in the cooling process; however, problems with high TDS in the cooling ponds have not been detected (Sullivan, pers. comm.).

Derby Dam to Pyramid Lake

Derby Dam, located 20 miles downstream of Reno, was constructed as part of the Newlands Project to divert water via the Truckee Canal to the Carson River. This is the largest single diversion from the river and as such has a dominant effect on the flow in the river below Derby Dam. This is especially true during the times when the majority of the river flow is diverted into the canal. The diversion controls flow during most of the year, except during floods, and therefore has a controlling effect upon the water quality within this reach. The timing of the diversion of flow to the lower river or the Truckee Canal can affect the distribution of nutrients to the two terminal reservoirs.

Accumulated silt and sediment have, at times, been flushed from behind Derby Dam into the river. This practice has had a serious effect upon the river below Derby Dam. Koch and Hainline (1976) found that this flushing was detrimental to the macroinvertebrate population. This flushing, however, has not taken place since 1975.

Below Derby Dam several tributary springs flow into the river. Many of these springs were first noticed about 10 years after irrigation began on the benchlands at Fernley (Crowe, pers. comm.). A few of these springs and agricultural drains were sampled for water quality in June 1979 (Crowe, pers. comm.). The results of this single sampling are presented in Table F-6 and Figure F-9. The sampling locations consist of a salt marsh, spring, agricultural drain and a slough. From Table F-3 it can be seen that these subsurface

Table F-6

WATER QUALITY OF RETURN FLOWS TO THE TRUCKEE RIVER BELOW DERBY DAM

Location	Conductivity µmhos/cm	pH	Ca^{+2}+Mg^{+2} mg/l	Na^{+} mg/l	CO_3^{-2} mg/l	HCO_3^{-} mg/l	Cl^{-} mg/l	SO_4^{-2} mg/l	SAR mg/l
1	7,250	8.3	17.0	1,047	0	171	2,120	0	15.6
2	525	8.0	3.0	106	0	176	28	18.7	3.7
3	1,710	7.4	12.0	173	0	409	78	509	3.1
4	2,500	8.6	11.5	334	21	464	117	691	6.0

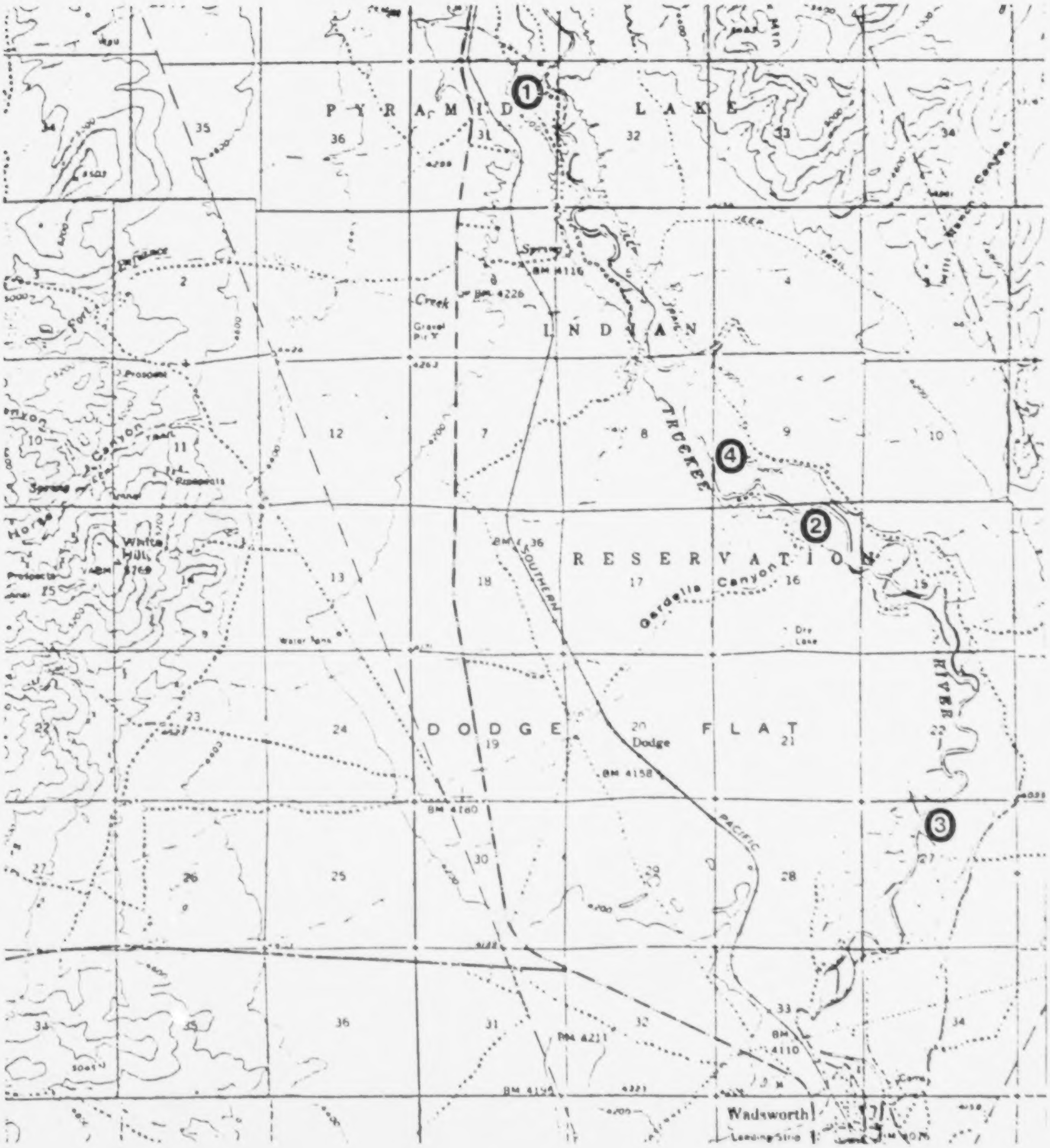
DATA SOURCE: Crowe, pers. comm.

Clark Station Truckee River upstream of Derby Dam	119*	7.6**	12.9**	8.6*	0**	46**	5.5**	6.8*	-

*DRI, 6-7-78
**DEP, 6-7-78

Figure F-9

WATER QUALITY SAMPLING LOCATIONS OF RETURN FLOWS FROM THE FERNLEY BENCHLANDS



SOURCE: Crowe, pers. comm.

drainage sources introduce rather high concentrations of dissolved minerals to the river. Conductance, for example, is extremely high in all four samples. These sources probably reflect, to some degree, the quality of irrigation return water from the benchland.

Within the river reach from Wadsworth to Nixon, groundwater plays an important role in contributing Ca^{+2}, Mg^{+2} and So_4^{-2} solutes to the river. During low flows half of the solute load to the river is attributable to groundwater (Glancy, et al., 1972). It has been estimated that the net contribution of Na^+, HCO_3^- and Cl^- solutes to Pyramid Lake from the river is on the order of 18,000 to 22,000 tons per year (Glancy, et al., 1972).

Soil samples were also collected from the reach below Wadsworth (Crowe, pers. comm.), the results of which are presented in Table F-6. The soils, as represented by these samples, are of varying quality. Since the soils have an effect on the quality of irrigation return water, the location and type of future irrigation will affect the total pollutant loads to the river.

EPA (1977), PEL (1979) and Kaiser Engineers (1973) found decreasing levels of nonconservative constituents (i.e., nutrients, BOD) below Derby Dam. This fact has been supported by other studies (Table F-1). However, conservative constituents such as TDS show an increase. It is apparent from the data that some degree of nutrient storage is occurring within the lower river, in addition to removal of nutrients due to diversions. This reduction in nutrient concentrations may also be due to other factors. During the times of the year when nearly all of the river is diverted at Derby Dam, the flow below Derby Dam is made up primarily of groundwater accretions which may have a lower nutrient load than river water, thus resulting in an apparent decrease in nutrients.

Studies have shown an improving water quality condition below Wadsworth. This condition is demonstrated by a decreasing periphyton biomass, but an increasing diversity and abundance PEL, 1979; Kaiser, 1973; EPA, 1971). Kaiser (1973) found Class II organisms (mildly tolerant to pollution) to increase in importance from Wadsworth to Nixon. Past studies, however, have not measured all biomass in the river. For example, in measuring periphyton, PEL used the glass slide technique which is biased toward diatoms and selects against macrophytes. Therefore, the biomass of measured algae decreased in the lower river. Other forms of aquatic plants, however, such as rooted plants and macrophytes, could be responsible for the uptake of nutrients in this reach. Tiehn (1978) identified several species of aquatic plants in the river below Wadsworth. Thus, although periphyton biomass is decreasing in the river below Derby Dam, total aquatic plant biomass may be increasing. This is suggested by the net decrease in nutrients in this reach as measured in several studies.

Past studies have shown increasing diversity of macroinvertebrates between Wadsworth and Nixon (PEL, 1979; Kaiser, 1973; EPA, 1971). Species which are intolerant to organic enrichment comprise a larger percentage of the total population than they do at stations between Vista and Wadsworth.

River flow during the summer and fall is generally low in this section of river. Low velocity and reduced canopy have contributed to high water temperature, conditions that often exceed state temperature standards, and which exceed the lethal level for the Lahontan cutthroat trout (Table F-7). Currently, water is being released from Stampede Reservoir during cutthroat trout spawning to help maintain water temperatures and flows suitable for spawning and hatching. The flow regime necessary to maintain a given temperature was derived by Rowell (1975). During times of the year when water is not being released for trout spawning, the water temperature becomes too high for trout. It is uncertain whether cui-ui or Lahontan cutthroat trout occupy the lower river during these warmer periods.

Major Pollutional Inputs

Agriculture

The Truckee River basin supports agriculture between Verdi and Pyramid Lake. Irrigated pasture is the primary agricultural use, comprising 88 percent of the total irrigated acreage (Table F-8). Most of the irrigated pasture is used for grazing with total cattle population ranging from 4,000 to 13,000 head, depending on market conditions. Next to pasture, alfalfa is the largest irrigated crop. Potatoes, corn and onions are grown but occupy a much smaller percentage of the total irrigated land.

The Newlands Project, located in the Carson River basin, obtains water from the Truckee River but most return flows remain in the Carson River basin. Some irrigation water from the Truckee segment of the Newlands Project returns to the Truckee River (Figure F-1).

Over the last several years there has been a decrease in agricultural acreage within the Truckee Meadows. This decline is generally a result of agricultural land being converted to urban uses or the water right to the land being purchased, thus leaving the land unusable for agriculture. This trend of agricultural and water right use conversion is expected to continue in the future. In addition, at one time 36 ditches and pumps diverted water from the Truckee River for agricultural and municipal and industrial uses; currently, only 18 diversions are in operation (DRI and Walters Engineers, 1979).

Table F-7

WATER QUALITY REQUIRED FOR SEVERAL BENEFICIAL USES

Water Quality Parameter	Beneficial Uses				Water Quality below Derby Dam, DRI 1978-1979 Average
	M&I	Recreation	Agriculture	Fish	
pH	5-9	6.5-8.3	4.5-9.0	6.5-9.0	7.83
Chlorine	250 mg/l			2 µg/l	15.6 mg/l
PO_4-P					.41 mg/l
NO_3-N	10 mg/l				.66 mg/l
NH_3-N				.02 mg/l	
TDS			500-1,000 mg/l		202.1 mg/l
Turbidity		4 ft Secchi Disk			
Fecal Coliform	2,000	200	1,000		
Alkalinity	50-500 mg/l			20 mg/l	
Cu	1 mg/l			$.1 \times LC_{50}$*	
Fe	.3 mg/l			1.0 mg/l	
Pb	50 µg/l			$.01 \times LC_{50}$*	

*96 hour

DATA SOURCE: EPA, 1976; DRI records[2].

Table F-8

ACREAGES OF IRRIGATED LANDS IN THE NEVADA PORTION OF THE TRUCKEE RIVER BASIN

Area	Pasture		Alfalfa		Grain		Corn		Onions		Orchard		Potatoes		Sudan Grass		Golf Course		Cemetery		Lawn		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
Truckee Meadows	10,976.7	85	1,143.2	9	84.1	<1	12.4	<1	7.6	<1							410.5	3	50.7	<1	264.3	2	12,949.5
Steamboat to South End of Washoe Valley	4,720.5	95	42.8	1	183.1	4																	4,946.4
Spanish Springs Area	2,153.4	87	303.9	12									17.4	1									2,474.7
Chalk Hills West to Verdi Area	940.1	99																	4.6	<1	2.3	<1	947
Truckee River (Vista to Wadsworth)	531.1	54	249.4	26	54.2	6			126.7	13	12.5	1											973.9
Fernley Area	1,809.4	53	1,480.1	44	22.2	4									51.6	2							3,388.8
Wadsworth Area	465.3	40	633.7	54	51.2	4	18.9	2															1,169.1
Nixon	228	47	262	53																			490
																							154,419.4

DATA SOURCE: NRC, Inc., 1979, unpublished data¹.

During the irrigation season, the quality of the Truckee River is greatly influenced by agricultural return water. To estimate the effects on the river, a sampling study was conducted by URS (1977) to monitor water quality in several ditches from June to September 1977 (Figure F-10 and Table F-9).

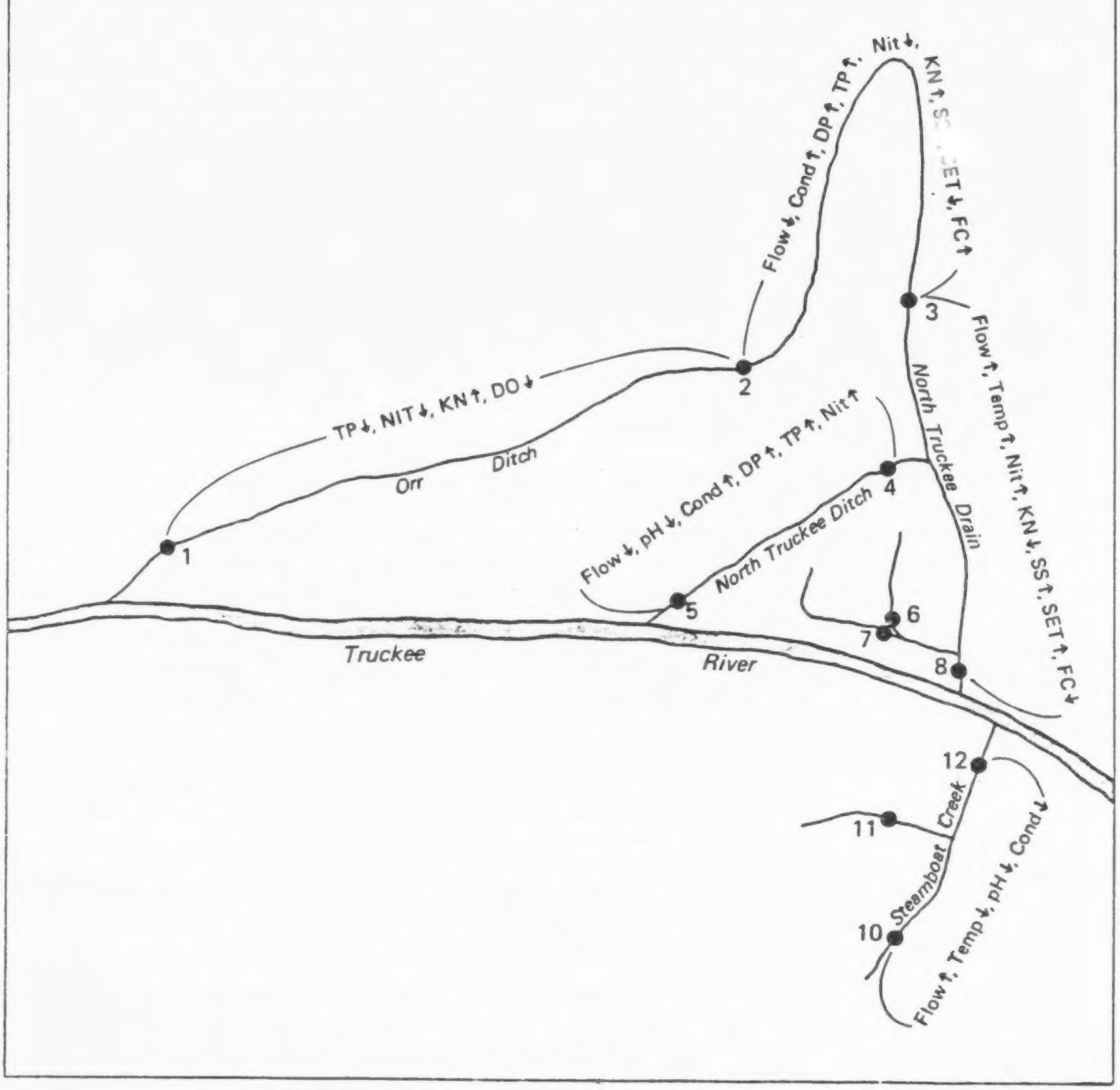
This study used the net change of the quality of irrigation ditch water within Spanish Springs Valley (difference between Stations 3 and 2, shown in Figure F-10), to derive an index of the effect of prevalent agricultural practices upon irrigation water. The change in quality through Spanish Springs Valley was assumed in that study to represent the effect of agricultural return flows only since the valley lacks a significant urban component. Using this assumption and the Spanish Springs Valley data an areal loading rate was computed based upon 1,133 acres of irrigated land in the Spanish Springs Valley. This areal loading rate was then applied to the remaining Truckee Meadows agricultural lands which apply water under a water right, to compute the total agricultural pollutant load.

The use of the Spanish Springs Valley test case data was based upon the assumption that Spanish Springs Valley agriculture is representative of all Truckee Meadows and Washoe Valley agriculture. This assumption is weak in regard to several points. First, environmental conditions vary among subbasins of the areas, e.g., microclimate, soil permeability, other soil characteristics, land uses and drainage characteristics. However, the study is the most relevant available and is therefore used in the analyses of this EIS.

If the areal loading rates for Spanish Springs Valley (Table F-10) are applied to the total number of acres in the Truckee Meadows and Spanish Springs Valley irrigated with surface water from Orr Ditch rights, the daily load from these lands can be calculated. The total acres of land irrigated using Orr Ditch water rights as of 1978 was determined by URS (1979). The computed loads are given in Table F-11.

The Stations 2 and 3 data are assumed to represent the net uptake or loss of individual constituents due to agricultural water use. The difference between these data and what would be obtained by taking the difference between other sampling stations (10 and 12 representing Steamboat Creek drainage area, for example) is assumed to be due to inputs other than agriculture. These inputs come from urban runoff, lawn watering, septic tank leachate and industrial process loads that discharge through storm drains or point sources.

Figure F-10. Location of Sample Points on Truckee Meadows Ditches.



N

LEGEND:
Cond - Conductivity
Temp - Temperature
DP - Dissolved Phosphorus
TP - Total Phosphorus
Nit - Nitrate
KN - Kjeldahl Nitrogen
DO - Dissolved Oxygen
FC - Fecal Coliforms
SS - Suspended Solids
SET - Setteable Solids
↓ Significant DECREASE in Parameter Concentrations
↑ Significant INCREASE in Parameter Concentration

SOURCE: URS, 1977.

Table F-9

MEAN CONCENTRATION OF CONSTITUENTS IN IRRIGATION DITCHES

Station[1] Number	Number of Samples	Flow cfs	Temp °C	pH	Conductivity µmho/cm	Dissolved Phosphorus mgP/l	Total Phosphorus mgP/l	Nitrate mgN/l	Kjeldahl Nitrogen mgN/l	Suspended Solids mg/l	Settleable Solids mg/l	Dissolved Oxygen mg/l	BOD mg/l	Fecal Coliforms Org./100 ml
1	3	61.0	14.0	8.1	108	0.04	0.04	0.07	0.43	21.1	11.5	9.4	2.8	265
2	7	47.9	16.5	8.0	122	0.02	0.03	0.04	0.51	23.9	15.2	8.0	1.6	289
3	8	16.6	16.3	8.1	438	0.09	0.11	0.02	1.16	10.4	5.1	7.6	3.0	943
8	8	32.9	19.6	8.2	425	0.08	0.11	0.36	0.80	29.4	18.4	8.2	1.8	351
5	3	12.8	18.3	9.1	123	0.02	0.04	0.02	0.45	23.7	16.7	9.6	2.7	353
4	7	4.2	19.3	8.6	140	0.05	0.07	0.04	0.55	17.8	5.9	9.8	1.7	502
6	8	8.0	20.8	8.1	411	0.10	0.12	0.03	0.88	20.9	11.1	7.7	1.9	138
7	4	11.25	16.6	8.2	530	0.06	0.07	0.69	0.46	14.2	5.4	9.3	2.3	56
10	5	2.0	25.4	8.5	1062	0.25	0.31	0.07	1.36	34.3	18.7	7.0	1.8	1122
11	5	15.1	25.2	8.3	464	0.24	0.33	0.35	1.54	55.6	42.7	6.7	2.5	3822
12	5	15.7	19.8	8.2	398	0.27	0.40	0.24	1.18	37.9	16.5	6.6	2.3	772

[1] Station number corresponding to Figure F-3.

SOURCE: URS, 1977.

Table F-10

AREAL LOADING RATES CALCULATED FOR AGRICULTURE IN SPANISH SPRINGS VALLEY
(lbs/acre-day)

Parameter	Areal Load
Dissolved Solids	0.54
Suspended Solids	-1.49[1]
Settleable Solids	-1.02
BOD	-0.014
Total Phosphorus	0.0010
Dissolved Phosphorus	0.0012
Nitrate	-0.014
Kjeldahl Nitrogen	-0.005
Fecal Coliforms (10^8/acre-day)	1.36

[1] Negative loads were derived for certain parameters because the load in the return flow leaving Spanish Springs Valley was actually less than in the irrigation water entering the Valley.

For example, if 10 cfs of Truckee River water is diverted to Spanish Springs Valley with a suspended solids concentration of 50 mg/l, the daily load for such a diversion is 2612 lbs. If 3 cfs and 20 mg/l suspended solids, are measured in the return flow from the valley, the return load is 313 lb/day. The difference (-2299 lbs) is lost to irrigated lands and is represented as a negative load.

SOURCE: URS, 1977.

Table F-11

AGRICULTURAL LOADS FROM IRRIGATED LANDS WITHIN THE TRUCKEE MEADOWS[1] PER DRAINAGE AREA

	Steamboat Creek	N. Truckee Drain	Truckee River
Acres	9,946	2,809	1,908
Dissolved Solids mg/l	5,371	1,517	1,030
Settleable Solids mg/l	-10,145	-4,185	-2,843
Suspended Solids mg/l	-14,820	-2,865	-1,946
BOD mg/l	-139	-39	-27
Total Phosphorus mg/l-P	10	3	2
Dissolved Phosphorus mg/l-P	12	3	2
Nitrate mg/l-N	-139	-39	-27
Kjeldahl Nitrogen mg/l-N	-50	-14	-10
Fecal Coliform #/100 ml	13,527	3,820	2,595

[1] Only includes lands irrigated by Orr Ditch water rights as determined by URS, 1979c. Excluding south of Steamboat.

DATA SOURCE: URS, 1977.

As shown in Table F-11, agricultural land in the Truckee Meadows apparently represents a sink for suspended solids, settleable solids, BOD, nitrate and Kjeldahl nitrogen, and a source of total dissolved phosphorus, fecal coliforms and dissolved solids.

Guitjens, et al. (1978) examined the water quality changes in irrigation water in the Carson River basin. This work examined changes in pounds per acre of constituents based upon total flow and average concentration during an irrigation season. On a total flow basis, a deterioration of water quality from agricultural land was found for BOD on three of the ranches examined and for BOD, total phosphorus and orthphosphate on a fourth. This work differs, however, from URS in that URS examined the average instantaneous loads over the irrigation season whereas Guitjens, et al., examined the total load over the irrigation season.

Urban

The Truckee Meadows urban area is composed primarily of the Cities of Reno and Sparks. During the 1940s Reno and Sparks were two distinct cities. Since then urban expansion has blended the cities together. Currently there are 26,000 acres of urbanized land within the Truckee Meadows (URS, 1977).

The Reno-Sparks area has at times experienced extensive flooding and thus, the cities have developed a defined storm drainage system. Prior to 1957, the system was a combined storm water-sanitary sewage system. This system, however, often experienced overflow problems during high runoff periods. At the present time, storm water and sewage flow in separate systems.

The Reno-Sparks area consists of 20 subbasins which drain into the Truckee River by three paths: directly into the river, into Steamboat Creek and into the North Truckee Drain. A small amount enters the Orr Ditch and flows through Spanish Springs Valley. In the future, however, these flows will be routed away from Orr Ditch (WCOG, 1978). Figure F-11 shows the drainage pattern of the Reno-Sparks area and Figure F-12 gives a breakdown of the different subbasins. The northwestern portion of Reno tends to drain directly into the Truckee River while the southern portion drains into Boynton Slough and then into Steamboat Creek. Sparks, on the other hand, tends to drain to the North Truckee Drain.

As urbanization in the Truckee Meadows increases, the amount of storm-related urban runoff is expected to increase. Pollutional inputs from these storms are typically related to particulate matter, oil and grease, debris and detritus that accumulate on impermeable surfaces, e.g., roads and

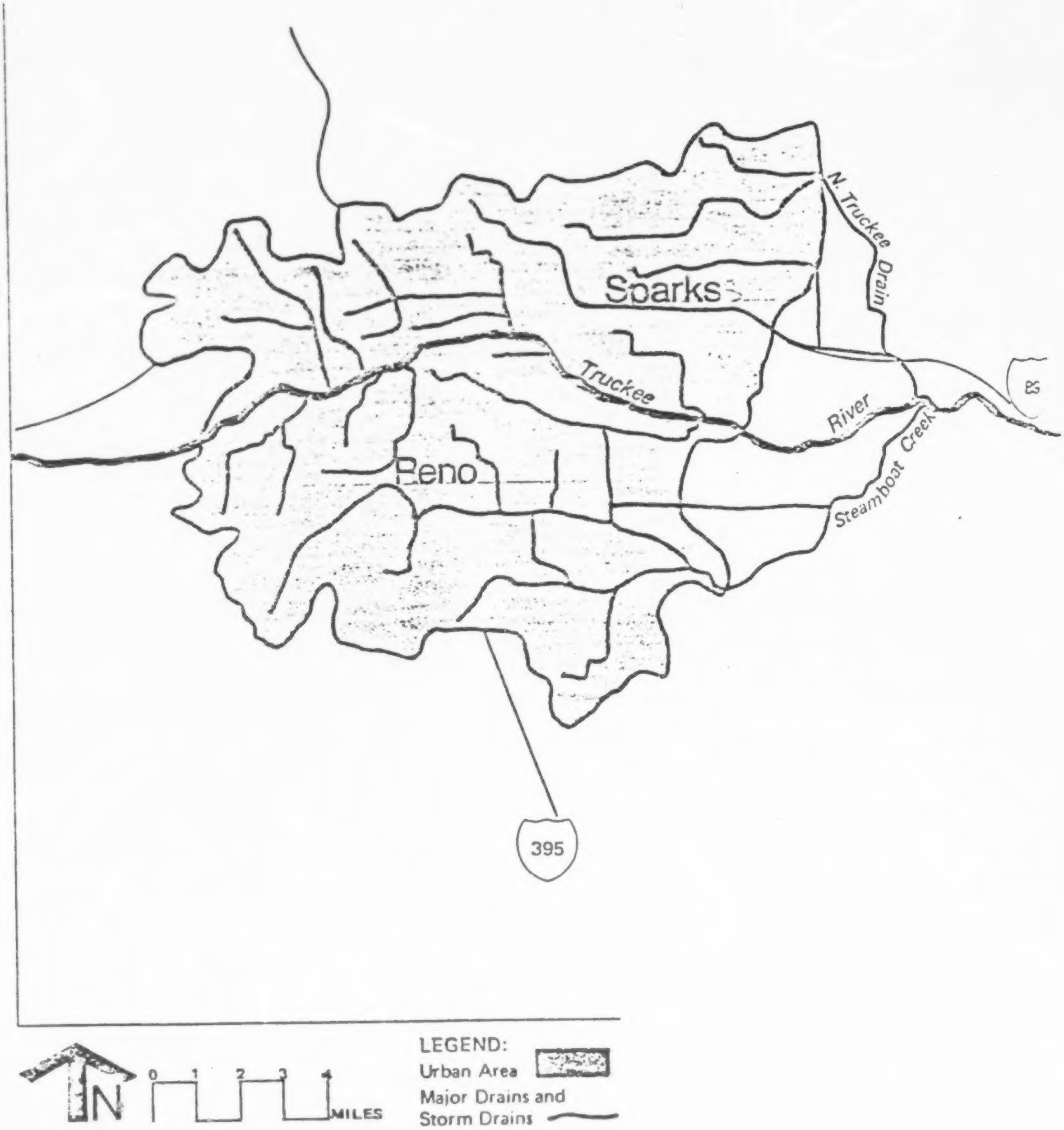
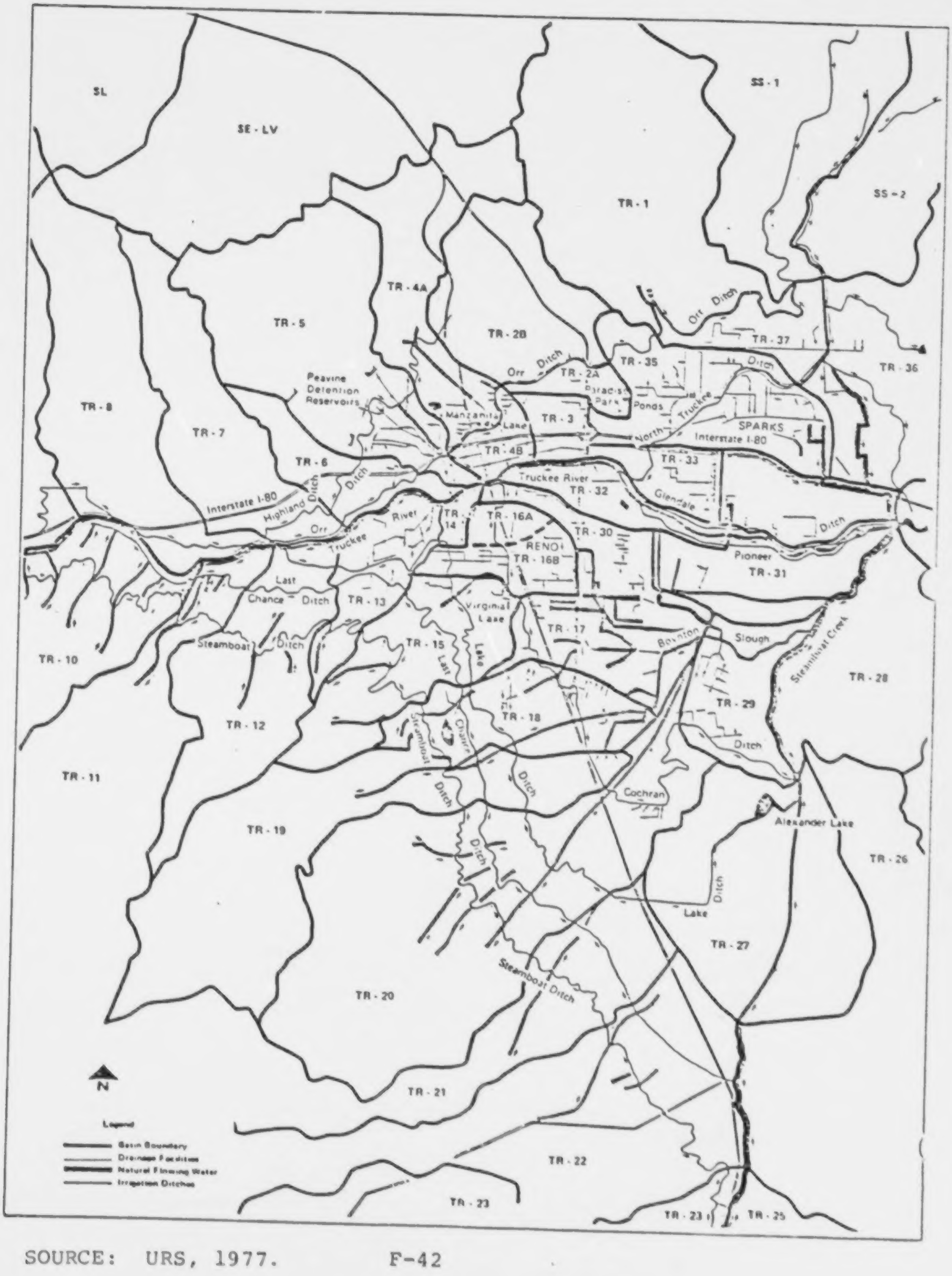


Figure F-11. Major Drainage system in the Reno-Sparks Urban Area.

Source: URS, 1977.

Figure F-12. Schematic Storm Drainage System in the Reno-Sparks Area.



SOURCE: URS, 1977.

sidewalks, between storm events. When large rainstorms occur these potential pollutants are washed into storm drains and then into the river. During summer months rainfall is infrequent but heavy when it occurs. Thus, pollutants accumulate and are washed off in large quantities.

URS (1977) attempted to quantify the input to the river by storm events. In these studies a worst case approach was used as the governing criteria for computing pollutant loads. The worst case situation was described as a summer storm with .35 inches of rainfall with a duration of 3 hours and with 4 hours of runoff, that would occur once every 2 years. A summer storm was used since it occurs quite often when Truckee River flow is the lowest. The test storm and its runoff were simulated using the U. S. Army Corps of Engineers STORM model (URS, 1977). The output, expressed as quality and quantity of the storm runoff, was routed into the Orr Ditch, North Truckee Drain, Steamboat Creek and directly into the Truckee River. The model was calibrated against two storm events that were measured for quantity and quality. The first of the two storms happened to be similar in size to the simulated storm.

Estimated flows generated by this storm event can be found in Table F-12. The average and peak pollutant loads in pounds per storm and pounds per hour are summarized in Tables F-13 and F-14.

URS (1977) found that the subbasins of downtown Reno and Sparks have the highest pollutant loads of any of the subbasins. The subbasins having the largest component of nonurban land had the lowest concentrations of pollutants in the storm runoff. These results were interpreted by URS to indicate that urban lands are a greater source of pollutants during storm events than nonurban land.

Agricultural and Urban Pollutional Inputs

As described earlier, the work done by URS determined that agriculture in Spanish Springs Valley (and by inference the entire Truckee Meadows) acted as a sink for several water quality constituents. Urban lands, on the other hand, act as a source of these same constituents, especially following storm events.

Water quality conditions present in the North Truckee Drain and Steamboat Creek at their confluences with the Truckee River, (Stations 8 and 12), reflect a composite of background conditions, agricultural return flows, urban runoff, and occasionally stormwater flows. Water quality measured in several studies at these two points is summarized in Table F-15.

Table F-12

ESTIMATED PEAK FLOW RATES FOR 2-YEAR SUMMER STORM

RENO-SPARKS AREA

	Peak Flow Rates (cfs)
Orr Ditch (via Spanish Springs)	17
N. Truckee Drain	32
Truckee River	108
Steamboat Creek	78
Total*	165

*Total flow rate is based on a routing of the individual flows through the Vista gaging station and does not include the Orr Ditch flows, since their input is delayed for several days due to their passage through Spanish Springs.

SOURCE: URS, 1977.

Table F-13

ESTIMATED PEAK URBAN POLLUTANT LOADS
RENO-SPARKS AREA

(All parameters in lbs/hr. except
for bacteria [billion MPN/hour])

	Orr Ditch (via Spanish Springs)	N. Truckee Drain	Truckee River	Steamboat Creek	Total*
BOD_5	13	39	130	89	198
COD	77	240	750	540	1200
Suspended Solids	4000	11,000	36,000	22,000	53,000
NO_3	1.0	3.1	10	6.2	15
NH_4	6.5	19	60	35	87
ORGN	5.5	17	54	39	83
OPO_4	1.2	4.1	12	9.3	19
TPO_4	3.7	11	34	20	43
Cd	0.02	0.05	0.16	0.09	0.23
Cr	0.10	0.27	0.89	0.55	1.3
Cu	0.3	0.9	2.7	1.9	4.1
Pb	3.0	8.7	29	19	43
FCOLI	280	770	2600	1500	3800
TCOLI	3700	10,000	34,000	19,000	48,000

* Total load is based on a routing of the individual loads through the Vista gaging station and does not include the Orr Ditch loads, since their input is delayed for several days due to their passage through Spanish Springs. Peak pollutant load is defined as the peak one-hour load calculated by the STORM model for each drainage group.

SOURCE: URS, 1977.

Table F-14

ESTIMATED AVERAGE URBAN POLLUTANT LOADS
RENO-SPARKS AREA

(All parameters in lbs/storm[1] except for bacteria billion MPN/storm)

	Orr Ditch (via Spanish Springs)	N. Truckee Drain	Truckee River	Steamboat Creek	Total*
BOD_5	28	68	460	180	710
COD	170	440	2800	1100	4300
Suspended Solids	8500	20,000	120,000	45,000	190,000
NO_3	2	5	36	13	54
NH_4	14	34	200	41	280
ORGN	12	31	200	80	310
OPO_4	3	8	43	18	69
TPO_4	8	19	110	41	170
Cd	0.02	0.08	0.54	0.20	0.82
Cr	0.1	0.4	2.8	1.2	4.4
Cu	0.6	0.8	12	4	17
Pb	7	16	100	39	160
FCOLI	600	1400	8500	3100	13,000
TCOLI	8000	19,000	110,000	39,000	170,000

[1] The storm used in this analysis delivered 0.35 inches of rainfall in a 3 hour period (a typical summer storm with a recurrence interval of 2 years). The runoff generated by this storm extends over a 4 hour period.

* Total load is based on a routing of the individual loads through the Vista gaging station and does not include the Orr Ditch loads, since their input is delayed for several days due to their passage through Spanish Springs. Average pollutant load is defined as the total pollutant load calculated by the STORM model for each drainage group.

SOURCE: URS, 1977.

Table F-15

WATER QUALITY CONDITIONS IN THE NORTH TRUCKEE DRAIN AND STEAMBOAT CREEK

Date	Flow		pH		Ammonia		Organic Nitrogen		NO_2+NO_3		Total Phosphorus		DO		BOD		TDS		Cl	
	SC*	NTD**	SC	NTD	SC	NTD	SC	NTD	SC	NTD	SC	NTD	SC	NTD	SC	NTD	SC	NTD	SC	NTD
EPA 1977 3/28-4/4[1]	20	24	7.8 8.6	6.9 8.5	.19	.11	1.10	.72	.10	.62	.36	.12	10.1	9.2	3.9	1.8	450	260	79	11.0
URS 1977 6-9/77[2]	15.7	32.9	8.2	8.2	-	-	-	-	-	-	.40	.11	-	-	2.3	1.8	271	289	-	-
PEL 10/77-8/78[3]	-	-	7.4 8.0	-	.12	-	1.91	-	.25	-	-	-	-	-	4.3	-	308	-	50	-
EPA 1968[4]	-	-	7.7 8.4	6.8 8.5	.27	.20	.43	.51	-	-	.285	.130	8.2	8.1	-	-	243	193	-	-
DRI 1977-78[5]	-	-	7.4 8.3		.09	.03	.90	.53	.22	.57	.28	.13	-	-	-	-	432	393	60	14.2

* Steamboat Creek
** North Truckee Drain

SOURCES:
[1] EPA, 1977.
[2] URS, 1977.
[3] PEL, 1979.
[4] EPA, 1971.
[5] DRI records[2].

The concentrations represent what will enter the river from the North Truckee Drain and Steamboat Creek without the JWPCP effluent. A comparison of these values with the historical conditions at Boynton Lane shows higher total phosphorus, TDS, organic nitrogen, nitrate, nitrite and chloride. BOD is about the same and ammonia shows a slight increase. If agricultural and urban storm water loads are subtracted from the total load at Stations 8 and 12, the effect of industrial discharges and nonstorm urban runoff can be determined.

If agricultural lands in the Truckee Meadows do in fact act as a sink for nitrogen and a source of phosphorus, then the high levels of phosphorus found in Steamboat Creek upstream of the JWPCP and the North Truckee Drain are from agricultural and urban uses, whereas nitrogen is due primarily to urban wastes.

Standards Exceedence

As part of the water quality analyses presented in the EIS, an evaluation of the probability of achieving water quality standards after expansion of the JWPCP to 40 mgd was developed. Tables F-16, F-17 and F-18 illustrate the probability of equalling or exceeding those flows necessary to dilute the estimated loads of various pollutants in the Truckee River to the extent that water quality standards will be met.

Table F-16

PERCENT PROBABILITIES OF EQUALLING OR EXCEEDING RIVER FLOWS NECESSARY FOR ACHIEVING WATER QUALITY STANDARDS AT VISTA FOR RIVER DISCHARGE OF 40 MGD

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Standard (mg/1)
40 mgd, River Disposal, 288 Criteria													
Total Nitrogen-N	2	2	5	6	6	13	33	50	36	6	*	*	.75[2]
Total Phosphate-P	3	3	6	6	6	19	72	65	40	7	*	*	.05[3]
TDS	51	36	82	72	77	81	99	87	69	30	22	31	160.0[2]
Chloride	91	89	89	92	94	97	99	99	98	86	96	96	18.0[1]
BOD	90	83	79	89	93	98	99	99	98	59	96	94	3.0[1]
40 mgd, River Disposal, 406 Criteria													
Total Nitrogen-N	2	2	4	6	6	13	27	47	39	6	*	*	
Total Phosphate-P	3	3	6	7	10	15	35	59	44	6	*	*	
TDS	13	36	52	76	81	93	99	97	87	32	4	5	
Chloride	84	88	88	90	93	97	99	98	96	94	94	90	
BOD	92	80	81	92	93	97	99	99	92	90	90	92	

Footnotes:

[1] single value

[2] annual average

[3] 0.15 mg-PO_4/L annual average

*less than 1.0

DATA SOURCE: Jones & Stokes Associates and DRI, 1980.

Table F-17

PERCENT PROBABILITIES OF EQUALLING OR EXCEEDING RIVER FLOWS NECESSARY FOR ACHIEVING WATER QUALITY STANDARDS AT VISTA FOR LAND DISCHARGE OF 40 MGD

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Standard (mg/1)
Land Disposal, 288 Criteria													
Total Nitrogen	3	2	6	10	7	26	80	78	44	10	*	*	0.75[2]
Total Phosphate	5	3	7	22	25	91	94	96	77	25	*	*	0.05[3]
TDS	89	85	85	90	93	96	99	99	96	92	92	93	160.0[2]
Chloride	89	88	89	92	94	97	99	99	97	97	97	93	18.0[1]
BOD	85	89	89	93	96	97	99	99	97	96	92	92	3.0[1]
Land Disposal, 406 Criteria													
Total Nitrogen	4	2	6	8	9	17	38	59	46	14	14	25	
Total Phosphate	38	5	7	18	18	67	63	76	61	26	27	28	
TDS	85	86	86	89	92	96	99	98	97	97	90	89	
Chloride	85	89	89	93	96	97	99	99	97	96	93	92	
BOD	89	88	90	93	96	97	99	99	98	97	96	93	

Footnotes:

[1] Single value
[2] Annual average
[3] 0.15 mg-PO_4/L annual average
*Less than 1

DATA SOURCE: Jones & Stokes Associates and DRI, 1980.

Table F-18

PERCENT PROBABILITIES OF EQUALLING OR EXCEEDING RIVER FLOWS NECESSARY FOR ACHIEVING WATER QUALITY STANDARDS AT VISTA FOR TRUCKEE CANAL DISCHARGE OF 40 MGD

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Standard (mg/l)
Truckee Canal Disposal, 288 Criteria													
Total Nitrogen	5	2	6	9	12	27	81	81	48	11	*	*	0.75[2]
Total Phosphate	7	6	11	27	34	92	96	93	81	30	5	1	0.05[3]
TDS	92	87	82	91	93	97	99	99	98	95	95	94	160.0[2]
Chloride	92	89	89	93	95	97	99	99	98	97	94	94	18.0[1]
BOD	87	88	89	94	97	99	99	99	97	96	94	93	3.0[1]
Truckee Canal Disposal, 406 Criteria													
Total Nitrogen	3	2	6	10	10	19	43	60	50	11	9	17	
Total Phosphate	22	6	13	23	30	70	71	77	64	27	21	30	
TDS	86	87	87	90	93	98	99	98	97	95	93	92	
Chloride	85	89	89	93	96	98	99	99	97	96	94	92	
BOD	93	89	90	94	96	98	99	99	87	97	96	96	

Footnotes:

[1] Single value

[2] Annual average

[3] 0.15 mg-PO_4/L annual average

*Less than 1

DATA SOURCE: Jones & Stokes Associates and DRI, 1980.

WATER QUALITY APPENDIX

Footnotes

[1] Nevada Division of Environmental Protection records, unpublished. Truckee River water quality monitoring data. Available from Nevada Division of Environmental Protection, Carson City, Nevada.

[2] University of Nevada Desert Research Institute records, unpublished. Truckee River water quality monitoring data. Available from Desert Research Institute, Reno, Nevada.

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RENO-SPARKS JOINT WATER POLLUTION CONTROL PLANT MASTER PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix G

Hydrologic Modeling

October 1980

Prepared for:

U. S. Environmental Protection Agency
Region IX

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G-0

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G-0a

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ACRONYMS

DRI	University of Nevada, Desert Research Institute
EIS	Environmental Impact Statement
EPA	U. S. Environmental Protection Agency
GG+A	Gruen Gruen + Associates
JWPCP	Reno-Sparks Joint Water Pollution Control Plant
M&I	municipal and industrial
MGD	million gallons per day
ODD	Orr Ditch Decree
SPC	State Planning Coordinator
SPPCo	Sierra Pacific Power Company
TCID	Truckee-Carson Irrigation District
USBR	U. S. Bureau of Reclamation (now called Water and Power Resources Service)
USGS	U. S. Geological Survey

HYDROLOGIC MODELING

This appendix discusses the hydrologic modeling that was undertaken to identify Truckee River flow changes and quality changes that could be expected to result from alternative JWPCP options. The appendix presents the assumptions and conclusions of the modeling. It includes the land use assumptions developed to predict declines in agricultural land use resulting from projected urban growth; urban water use assumptions; and material supplementing the results published in the EIS.

Model Selection

In view of the complexity of the Truckee River system and its interrelated reservoir and diversion operating criteria, the unpredictable outcomes of litigation, and the effects of future growth on water use in the Truckee Meadows, it was decided to use a computerized model to identify those changes in flow likely to be caused by Master Project alternatives and to then separate these changes from changes likely to be caused by other influences. The Water and Power Resources Service (WPRS) (formerly the U. S. Bureau of Reclamation) developed a computer model of the river that reflects, to a reasonably accurate degree, the behavior of the Truckee River under current operating criteria. The model embodies the 75-year hydrologic record that started in 1900 and allows the imposition of user-selected basin management methods, i.e., criteria, and thereby allows an investigator to operate the river system model on an idealized, consistent basis for the 75-year period of record. Thus, the model creates an idealized, simulated output of what Truckee River flows would have been if the selected conditions had existed for the entire 75 years.

The WPRS model was modified for this EIS analysis to reflect a series of input assumptions relating to operational scenarios selected to represent the range within which Truckee River management could occur. The scenario operations represent future possibilities, such as future water consumption, conversion of agricultural lands to urban use, and alternative outcomes for the major pending litigations on the Truckee River.

The scenario analysis is especially pertinent, because the actual operation of the river probably cannot be replicated with great accuracy by any model. This occurs for several reasons. Although the day-to-day operations of facilities on the river are guided strongly by the established criteria, the actual operation differs due to many natural and human factors. Hydrologic data are not perfectly measured, diversions are seldom operated exactly as operating criteria would dictate, and management techniques by practical necessity undergo subtle or dramatic changes in times of flood and drought.

Since the main objective of modeling for the EIS analysis is to isolate and quantify the effects of the JWPCP Master Project alternatives relative to other major variables affecting the river, the use of the model output is largely confined to a series of sensitivity analyses. As the first step, one scenario, reflecting one possible growth level in the Truckee Meadows and one possible set of reservoir and diversion management criteria, was selected and modeled to include the three JWPCP wastewater disposal alternatives. The same process was repeated for other growth scenarios and river management scenarios. A full explanation of model assumptions and output is contained in this appendix. The percentage change in Truckee River flow corresponding to each Master Project disposal alternative was determined for each series of model runs. The results are compared in the following text and tables.

A discussion of model assumptions, scenarios and model output follows.

Model Assumptions

The assumptions developed for the model provide a relatively broad range of potential future conditions of flow in the Truckee River. It was assumed that the 75-year hydrologic record reasonably represents the range of drought and flood conditions likely to occur in the future. Assumptions as to water consumption changes, decrease in Truckee Meadows agriculture and alternative management methods for the Truckee River system were developed to bracket the more likely ranges of future conditions.

Land Use and Urban Growth Assumptions

Urban growth, for instance, is expected to increase M&I water use while decreasing agricultural water use. This exchange is a function of land use and related to population size. The following sections discuss the assumption used for land use and growth in the Truckee Meadows.

Population and Housing Projections. The population within the Truckee Meadows has been projected to the year 2000 by the Office of the State Planning Coordinator (SPC). These population projections can be translated into growth in urban acreage, number of houses and changes in land use by using estimated relationships between household size, housing density, urban mix, population and direction of growth.

On these bases, land use changes in the Truckee Meadows were projected for the short-term (1985) and then for the year 2000. The general amounts and locations of short-term residental housing growth were estimated from interviews conducted by Gruen Gruen + Associates (GG+A) with local developers regarding planned and approved projects (Appendix A). The population that would be accommodated by this housing growth was then estimated and compared with the SPC population projections.

This comparison showed that if all the housing projects identified by GG+A interviews as presently planned and approved are constructed they will accommodate the population projected by the SPC to about 1985. This includes allowance for a projected trend toward lower household size in future years.

Beyond 1985, no preferences for the location of residential construction are available. Therefore, the location of new housing to accommodate growth between 1985 and 2000 was arbitrarily determined to occur in areas planned for residential development in the adopted and proposed plans for the Truckee Meadows. Relatively level land within close proximity of Reno was given priority for this growth.

The net increases in housing from 1985 to 2000 were determined by dividing the total projected year 2000 population by the household size projected for that year, and subtracting the 1985 housing stock. Household sizes are projected to gradually decline, as shown in Table G-1. This implies that part of the future housing demand will result from new households spreading out from the existing housing stock as well as from an overall population increase.

The estimation of the year in which projected population increases and household size reductions will fill the projected short-term housing stock involves a trial-and-error solution. The number of units that GG+A estimated from developer and planning agency interviews as being planned in the "short-term" is a fixed number of units. While it should be recognized by the reader that reliance on these projections is arbitrary, and that the actually constructed units are likely to differ in timing, location and type in many cases, this information is the best available and was therefore used.

By selecting years on a trial basis and dividing projected population by household size for each trial year, it was determined that the number of short-term new units would be filled in about 1985.

Estimating housing requirements in the year 2000 involves merely dividing the projected population of 374,640 persons by the household size (2.79) to determine the total of 134,280 households. Between 1985 and 2000, some 52,884 new dwelling units are projected to be needed to accommodate population projections (Table G-2).

Distribution of Growth. Short-term (1985) growth was distributed by water service area by GG+A (Appendix A), and similar projections were made by Jones & Stokes Associates for the year 2000 growth. The three water service areas are: Sierra Pacific Power Company (SPPCo), Hidden Valley Water Company and the area outside either of these two service areas. This third category, referred to as outside, is comprised of the developments in the ranch area, southeast of Reno and the fringe areas surrounding SPPCo and Hidden Valley service areas. The methodology of these projections is further discussed as follows.

The acreage occupied by the projected short-term residential growth was computed using estimates of residential housing density made by GG+A (Appendix A). This yielded 5,232, 150, and 6,531 acres for SPPCo, Hidden Valley and outside areas, respectively (Table G-3).

The commercial, industrial, park, open space, streets and other public uses associated with projected increases in residential acreage were then estimated using the urban mix evidenced by Modesto, California (EPA, 1979). The mix for Modesto was used as an estimate since a detailed breakdown of urban uses is known and the two cities have similarities in terms of size and industrial/commercial mix. It was further assumed that Hidden Valley and the outside area will be bedroom communities and would not have an industrial component.

The long-term (year 2000) acreage distribution was estimated by assuming that the ranch area would fill to 80 percent of capacity (80 percent of 13,770 homes [Cooper, August 20, 1979]), with the rest of the growth allocated to SPPCo, Hidden Valley and the remainder of the outside area proportionate to GG+A projections (Appendix A).

The assumed trends in location of housing implied in Table G-2 may be more clearly seen in Table G-4. The year 2000 assumptions appear to reasonably extend the trends forecasted by GG+A to 1985.

It was also assumed that housing densities in all areas except the ranch area will be the same as in 1985. Table G-5 illustrates the breakdown in unit types.

The procedures used in converting these units to the acreages shown in Table G-3 are described as follows. The housing breakdown for the 1985-2000 residential growth is projected from Table G-5, subject to the following assumptions.

1. Hidden Valley will be the single family/multi-family mix conforming to the SPPCo densities of 4.7 and 22.9 units per acre.

2. In Hidden Valley, single family occupies 63 percent and multi-family occupies 37 percent of total units.

Table G-1. Projected Relationships Between Population, Household Size and Housing Needs In the Truckee Meadows, 1979-2000

Year	Projected Household Size, Persons Per Household[1]	Population Projections[2]	Required Total Housing Stock - Column 2 ÷ Column 1	Incremental Increase in Housing Stock
1979	2.89	157,300	54,429	26,967[3]
1980	2.89	-	-	
1985	2.83	230,354[1]	81,396	
1990	2.81	-	-	52,884
1995	2.80	-	-	
2000	2.79	374,640	134,280	

DATA SOURCES:

[1] GG+A projection, see Appendix A.

[2] State Planning Coordinator projections. Available from the State of Nevada Governors Office of Planning Coordination, Carson City, Nevada.

[3] Short-term increase in housing stock projected by GG+A based on interviews, see Appendix A calculations prepared by Jones & Stokes Associates.

Table G-2. Distribution of Truckee Meadows Population
and Housing Stock by Water Service Area,
1979-2000

Water Service Area	1979		1985		2000		Projected Demand for New Housing Units	
	Population	Housing Units @ 2.89 pers/H.U.		Housing Units @ 2.83 pers/H.U.	Population	Housing Units @ 2.79 pers/H.U.	1979-1985	1985-2000
Sierra Pacific Power Company	145,030	50,183	207,400	73,286	316,194	113,331	23,103	40,045
Hidden Valley Water Company	1,260	436	2,933	1,036	5,996	2,149	600	1,113
Outside areas	11,010	3,810	20,021	7,074	52,449	18,799	3,264	11,725
Totals	157,300	54,429	230,354	81,396	374,639	134,279	26,967	52,883

DATA SOURCE:

State Planning Coordinator population projections, Appendix A calculations prepared by Jones & Stokes Associates.

Table G-3. Incremental Acreages Projected to be
Occupied by Truckee Meadows Growth,
By Use, 1985-2000

Water Service Area	1979-1985 Increment (acres)					
	Residential	Commercial	Industrial	Public	Parks	Streets
Sierra Pacific Power Company	5,232	694	1,863	1,118	419	4,032
Hidden Valley Water Company	150	19	-	-	11	116
Outside Areas	6,531[1]	100	-	-	61	4,965
Totals	11,913	813	1,863	1,118	491	9,113

Water Service Area	1985-2000 Increment (acres)					
	Residential	Commercial	Industrial	Public	Parks	Streets
Sierra Pacific Power Company	6,201	636	2,654	1,656	477	4,293
Hidden Valley Water Company	167	34	-	-	21	129
Outside Areas[2]	2,828	361	-	-	218	1,400
Totals	9,196	1,031	2,654	1,656	716	5,822

[1] Includes entire ranch area.

[2] Ranch area included in 1979-1985 increment only. Excluded from 1985-2000 increment. See text.

DATA SOURCE:

EPA, 1979, Appendix A, State Planning Coordinator's population projection calculations prepared by Jones & Stokes Associates.

Table G-4. Assumed Location of Housing Units in Truckee Meadows, 1979-2000, By Percentage

	1979	1985	2000
Sierra Pacific Power Company	92%	90%	84.4%
Hidden Valley Water Company	0.8%	1.3%	1.6%
Outside - Ranch Portion Only	0%	2.6%	8.2%
Outside - Remainder	7.0%	6.1%	5.8%

DATA SOURCE:

State Planning Coordinators population projections, Appendix A, calculations prepared by Jones & Stokes Associates.

Table G-5. Projected Distribution of 1985 Housing Units in Sierra Pacific Power Company Service Area by Type and Density

	Single Family	Multi-Family	Townhouse	PUD
Units	14,458	6,763	1,324	358
Percent of Total Units	63.0%	30.0%	6.0%	1.0%
Average Density (Units/Acre)	4.7	22.9	9.3	8.0

DATA SOURCE: Appendix A, calculations prepared by Jones & Stokes Associates.

3. The outside area (not including ranch area) will be single family at a density of 1 unit per acre.

4. Since the acreage for the ranch area is fixed (and nearly all occupied by scattered low density development in the short-term), it was included in the 1985 growth increment entirely, and no portion of it was included in the year 2000 increment.

Using these assumptions, the housing distribution for the year 2000 can be projected. The estimated housing distribution and associated acreages are shown in Tables G-6 and G-7.

As can be seen, the growth scenarios bracket the growth that would be accommodated by the JWPCP Master Project at a capacity of 40 mgd. Thus, results from the year 2000 plus growth (51 mgd equivalent) provide an indication of conditions that might result if Reno grew beyond the size contemplated for the proposed JWPCP Master Project construction. However, since the analyses assume 1979 per capita M&I water consumption rates, and since per capita water consumption could decrease with meters or other conservation techniques, it is possible that a 40 mgd plant could accommodate a larger population than presently projected for that size of plant. A 40 mgd JWPCP together with package plants could also accommodate this higher population. Thus, for purposes of the analyses in this EIS the larger of the population estimates provides the most flexible tool for analyzing the effects of growth on river flow.

Urban and Agricultural Water Use Assumptions

Table G-8 is a summary of water distributed within the SPPCo system. The values are in acre-feet for the entire SPPCo system. In the left-hand column are number of customers and per customer use determined by Jones & Stokes Associates.

The residential water use figures being used by Jones & Stokes Associates are given in Table G-9. These were determined from 1 year of sampling of individual dwelling units conducted by SPPCo. It represents water use from September 1978 to August 1979. It must be noted that none of the homes was being billed for the amounts of water being used (other than the flat rate charged by SPPCo), and therefore the averages do not represent a conservation situation.

Table G-6. Assumed Distribution of Truckee Meadows Housing Units by Type, Year 2000[1]

Service Area	Increase in Homes 1985-2000	Single Family	Multi-Family	Townhouse	PUD
Sierra Pacific Power Company	40,045	25,228	12,014	2,403	400
Hidden Valley Water Company	1,113	701	412	-	-
Outside Areas	2,828[2]	2,828	-	-	-
Totals	43,986	28,757	12,426	2,403	400

[1] Based on Table G-6.
[2] Excludes ranch area. Computed as fringe area in 2000 less fringe area in 1985.

DATA SOURCES: Appendix A, State Planning Coordinator population projections prepared by Jones & Stokes Associates.

Table G-7. Assumed Distribution of Truckee Meadows Housing Units by Acreage Occupied, Year 2000[1]

Service Area	Total	Single Family	Multi-Family	Townhouse	PUD
Sierra Pacific Power Company	6,201	5,368	525	258	50
Hidden Valley Water Company	167	149	18	-	-
Outside Areas	2,828[2]	2,828	-	-	-
Totals	9,196	8,345	543	258	50

[1] Based on Table G-6.
[2] Assumes density of 1 home per acre, based on short-term densities in the area.

DATA SOURCES: Appendix A, State Planning Coordinator population projections, calculations projections prepared by Jones & Stokes Associates.

The reduction in irrigated acres within the Truckee Meadows was computed by comparing lands irrigated in 1978 (as identified by the URS Company, 1979), with Jones & Stokes Associates urban acreage projections for 1985 and 2000. These irrigated acres were then related to applied water through the use of irrigation duties specified in the Orr Ditch Decree (ODD). This actually provides an underestimation of the water applied since water is actually applied in excess of the duty specified in the ODD, for a particular ditch. However, since the current "seat-of-the-pants" operation of diversion into the ditches is hard to quantify, a strict adherence to the ODD was used for this analysis.

Each ditch not only has a duty, or rate at which water is applied, but also has a ditch loss. Both duty and ditch loss are specified in the ODD. The total diverted water was estimated using the applied water and the ditch loss for each ditch. Water was essentially "backed up" in each ditch to get a total diversion.

Example: Steamboat Ditch

Duty - 4.0 AF/acre (specified in ODD)
Ditch loss - 30 percent (specified in ODD)
Diversion - 4.0 + 0.30(4.0) = 5.2 AF/acre
(computed by Jones & Stokes Associates)
Water applied - 4.0 AF/acre x (acres)
Water diverted - 5.2 AF/acre x (acres)

The results of these computations are presented in Table G-10. It should be mentioned that applied water includes drain water (applying runoff from one field upon another), but diverted water does not include drain water.

Water consumption within the SPPCo system was estimated from Table G-8 and records of effluent flow from the JWPCP for the same period. (Data from EPA [1977] show that during the spring the influent and effluent flow at the JWPCP are approximately the same.)

Percent return flow was defined as JWPCP effluent/SPPCo total diversions (Table G-8). Consumption is therefore 1 percent return flow. The monthly averages of data for July 1970 to December 1978 are found in Table G-11.

Truckee Meadows Subroutine

The purpose of the Truckee Meadows subroutine is to estimate the net change in flow between Farad and Vista given several scenarios of urban growth and water use within the Truckee Meadows.

Table G-8. Water Distributed in the Sierra Pacific Power Company System (in acre-feet)

OUTPUT TO WATER DISTRIBUTION SYSTEM

Customer Year	JAN AC FT	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1965: 24626													
SURFACE WATER	980	1220	1526	1962	3120	3180	4060	3260	2780	2640	1820	1232	27720
GROUND WATER	530	60	49	[illegible]	414	433	825	660	244	161	9	460	4160
1158 gal/customer/day													
TOTAL	1510	[illegible]	1575	[illegible]	3534	3613	4885	3920	3024	2801	1829	1692	31889
1966: 25437													
SURFACE WATER	1250	1140	1420	3140	3760	4090	4930	4720	3420	2580	1220	975	32665
GROUND WATER	374	380	784	37[illegible]	441	600	737	664	294	113	463	472	5[illegible]03
1247													
TOTAL	1624	1520	2204	35[illegible]	4201	4692	5667	5384	3714	2693	1683	1447	[illegible]
1967: 25377													
SURFACE WATER	1010	1070	1028	1280	3260	3730	4862	4290	3400	2710	1210	1330	29269
GROUND WATER	191	274	461	165	610	366	757	45	141	37	9	224	4210
1197													
TOTAL	1201	1344	1489	1445	3870	4096	5619	4335	3541	2747	1219	1554	[illegible]
1968: 25810													
SURFACE WATER	1290	1016	1520	2870	3620	4490	5350	4250	3890	2600	1620	1330	33716
GROUND WATER	240	388	165	25[illegible]	410	264	916	462	231	22	2	197	[illegible]
1319													
TOTAL	1530	1404	1685	310[illegible]	4030	4754	6266	4712	4121	2622	1622	1527	351[illegible]
1969: 27419													
SURFACE WATER	920	940	1060	2160	3630	3360	4860	5170	4190	2210	1770	1210	31572
GROUND WATER	536	346	587	815	73[illegible]	565	1260	966	290	51	0	316	[illegible]
1260													
TOTAL	1456	1286	1647	2975	4360	3925	6120	6136	4480	2261	1770	1526	[illegible]
1970: 27[illegible]													
SURFACE WATER	[illegible]	1197	1460	2260	3930	3740	5550	5790	3770	2620	1610	1260	33477
GROUND WATER	840	322	557	261	414	517	770	459	507	120	24	262	6161
1221													
TOTAL	1550	1519	2017	2520	4344	4257	6320	6230	4277	2[illegible]0[illegible]	1634	1622	39433
1971: 28962													
SURFACE WATER	1190	1140	1195	2170	2720	4130	5020	5080	3860	2540	1840	1574	33407
GROUND WATER	475	328	577	447	141	567	976	774	271	52	24	340	5862
1151													
TOTAL	1665	1468	1772	2617	2861	4697	5996	5854	4131	2592	1864	1914	39271
1972: 30427													
SURFACE WATER	1272	1370	2040	3180	4250	4470	5690	5090	3600	1982	1830	1777	36509
GROUND WATER	910	502	612	291	471	730	1216	770	262	116	54	390	6468
1261													
TOTAL	2182	1872	2652	3471	4721	5200	6906	5860	3862	2098	1884	2167	42977

FROM SPPCo

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Table G-8 (cont.)

OUTPUT TO WATER DISTRIBUTION SYSTEM

Customer Year	JAN AC FT	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
1973: 31792													
SURFACE WATER	1440	1510	1510	2610	4170	4590	5320	5110	4350	2250	1230	1320	36540
GROUND WATER	[illegible]	545	542	660	797	1060	1494	670	336	127	131	610	7872
1247													
TOTAL	2136	1825	2022	3272	4763	5650	6824	5780	[illegible]	2379	1361	1930	44412
1974: 32868													
SURFACE WATER	1162	1575	1229	2560	4430	5330	5510	5570	4770	3180	1922	1831	39265
GROUND WATER	704	226	1012	607	675	1003	1040	735	422	87	0	196	6921
1257													
TOTAL	[illegible]	1801	2241	3167	5103	6333	6550	6305	[illegible]	3269	1922	2007	[illegible]
1975: 33886													
SURFACE WATER	[illegible]	[illegible]	1275	3060	[illegible]	[illegible]	[illegible]	[illegible]	3261	2192	2061	1955	36845
GROUND WATER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1270	[illegible]	611	226	61	149	6765
1149													
TOTAL	[illegible]	1853	2271	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2134	2024	43610
1976: 35422													
SURFACE WATER	1637	1518	1537	3225	5013	5217	5020	4445	[illegible]	3239	[illegible]	2094	39475
GROUND WATER	801	651	975	537	525	793	1320	626	[illegible]	54	175	167	6873
1169													
TOTAL	[illegible]	[illegible]	2519	3164	5613	6010	6510	5071	4118	3293	[illegible]	[illegible]	46371
1977: 36924													
SURFACE WATER	[illegible]	1325	1549	3143	2211	3395	4696	4796	[illegible]	2561	2094	1256	33455
GROUND WATER	583	675	672	[illegible]	725	721	1307	772	461	598	82	737	7239
924													
TOTAL	[illegible]	2000	2221	3627	[illegible]	4416	6003	5588	4425	3159	2176	1993	40699
1978 35446													
SURFACE WATER	657	787	1007	2510	4296	5264	5910	5657	3967	3056	2143	1312	37738
GROUND WATER	1377	[illegible]	1243	556	453	551	771	926	236	174	50	1030	8375
1060													45633
TOTAL	[illegible]	[illegible]	2250	3066	4749	5735	6711	6613	4203	3930	2193	2342	
1979		1088											
SURFACE WATER	1144	[illegible]	1614	2817									
GROUND WATER	1254	1159	852	533									
TOTAL	2398	2247	2466	3350									
1220 (1965-11, excluding '77													

Table G-9. Per Customer Water Use

	Single Family/ Multifamily Mix	Single Family Only
J	197	197
F	167	200
M	197	197
A	295	361
M	538	638
J	992	1,190
J	818	1,244
A	1,005	1,199
S	717	838
O	503	613
N	290	328
D	197	196
Avg.	477	600

DATA SOURCE: SPPCo data, September 1978-August 1979. Available from the Sierra Pacific Power Company, Reno, Nevada.

Per customer water use calculated by Jones & Stokes Associates based on SPPCo data.

Table G-10. Results of Land Use Study

Incremental Change in Irrigation

	Acres Removed from Irrigation (acres)	Reduction in Applied Water[1] (A/F)	Reduction in Diverted Water[2] (A/F)
1978-1985	5,052	15,574	14,822
1985-2000	7,448	35,975	34,907

Status of Agricultural Land

	Irrigated Acres (acres)	Water Applied[1] (A/F)	Water Diverted[2] (A/F)
1964	44,674[3]	-	-
1969	26,076[3]	-	-
1974	27,994[3]	-	-
1978	14,844	60,930	59,699
1985	9,792	45,356	44,877
2000	2,344	9,381	9,970

---

[1] Includes drain water. Applied water = Σ(irrigated acres) x (duty).

[2] Does not include drain water. Diverted water = Σ(irrigated acres) x (duty + ditch loss). No ditch loss for creek water.

[3] Source: Gustifson, pers. comm.

DATA SOURCE: Appendix A, Regional Planning Commission. 1978. Truckee Meadows land use plan (unadopted). Calculations prepared by Jones & Stokes Associates.

Table G-11. Monthly Averages of Flows Diverted by the SPPCo Which Return Through the JWPCP for 1971-1978

	J	F	M	A	M	J	J	A	S	O	N	D
Percent of Diverted Flow	79	78	72	48	38	30	27	30	37	55	76	79

DATA SOURCES: Sierra Pacific Power Company unpublished records. Available from Sierra Pacific Power Company, Reno, Nevada. DRI and Walters Engineers, 1979. Calculations prepared by Jones & Stokes Associates.

The various inputs to the subroutine for current and hypothetical future conditions relate to agricultural and urban water use and consumption and also tributary inflow to the river. Groundwater parameters were estimated by assuming that the quality limitations of the groundwater basin would result in the management of the basin at about 1979 levels with no long-term changes.

The subroutine operates by taking the flow at Farad and subtracting M&I diversions then agricultural irrigation water diversions. The return flows from these two uses are then added in along with the tributary flow.

The parameters and assumptions used in the subroutine are discussed below and summarized in Table G-12.

Variable	Description
Hunter	This variable represents the flow of Hunter Creek. It is based upon a linear correlation with the unregulated flow in Prosser Creek.
Trib	This is the variable that represents the tributary inflow to the Truckee River between Farad and Vista, excluding Hunter Creek. This includes spring runoff from snowmelt and precipitation runoff. It is also based upon the flow of Prosser Creek.
ppt	This variable represents the immediate runoff from urban surfaces due to precipitation. It is based upon the total precipitation for each month as measured at the Reno gage. The runoff is computed by using the coefficient method utilizing an average condition computed from WCOG's STORM model simulation. This variable does not differentiate between snowmelt and rainfall runoff in the urban area and treats the rainfall for a month as one storm as opposed to separate storms.
Agricultural Diversion	The amount of water diverted from the Truckee River for agricultural irrigation.
Agricultural Return	The amount of water returned to the river from agricultural irrigation. It is based upon the total agricultural diversion.

Total Agricultural Diversion	This variable represents the sum of the agricultural diversion from the Truckee River and the agricultural diversion from the creek.
SPPCo	The total Sierra Pacific Power Company surface water diversion.
JWPCP	Sewage treatment plant returns to the river. It is based upon the M&I total diversion amended by the M&I consumption rates for that month.

Assumptions Used in The Subroutine.

1. Since heavy pumping and overdraft of the basin is likely to cause quality problems, it is assumed that the basin will be managed to protect its quality and that a relatively stable water surface will result.

2. Based upon work done by URS (1979) it was determined that in 1978, 2,483 acres of land were irrigated using creek water. At an Orr Ditch Decree right of 4 acre-feet per acre this amounts to 9,932 acre-feet per year. Assuming this quantity of water will be diverted from the creeks and applied to the land, and that a maximum of 20 percent will be diverted in any one month, it was estimated that the water would be diverted and applied as follows:

Month	Diversion/Application
April	497 acre-feet
May	1,986 acre-feet
June	1,986 acre-feet
July	1,986 acre-feet
August	1,986 acre-feet
September	994 acre-feet
October	497 acre-feet

The creek demand and diversion is projected to be 3,396 and 664 acre-feet per year in 1985 and 2000, respectively, and will be allocated as follows:

Month	1985 Application	2000 Application
April	170 acre-feet	34 acre-feet
May	679 acre-feet	133 acre-feet
June	679 acre-feet	133 acre-feet
July	679 acre-feet	133 acre-feet
August	679 acre-feet	133 acre-feet
September	340 acre-feet	67 acre-feet
October	170 acre-feet	34 acre-feet

3. The tributary flow and agricultural return flow are assumed to be a varying percentage of Hunter Creek flows and agricultural diversions, respectively. These percentages were estimated from a water balance over several years and are as follows:

Month	Agricultural Return (% of Diversion)	Tributary Flow (mult. by Hunter Creek)
January		15.1
February		14.9
March		13.6
April	23.0	6.3
May	27.5	6.5
June	33.0	11.0
July	34.6	11.4
August	39.4	11.1
September	40.2	11.1
October	42.4	11.5
November		11.9
December		11.0

Hunter Creek flow was used as a basis for the tributary flow since it has the most complete flow records of the tributaries.

The percentages do not represent pure numbers but are rather "catchall" terms that include evaporation, unmeasured inflow and other perturbations that vary the actual tributary or agricultural return flow.

In the future, groundwater recharge from agricultural irrigation will decrease, and under assumption No. 1, pumping of groundwater will decrease. Changes in the monthly groundwater/surface water interchange may result. It will be assumed, however, that since the water table is assumed to be static in the future, then the monthly variations in this interchange will not be significantly different from current conditions and the above percentages will be reasonably representative.

4. Agricultural and municipal water demand in the future will follow estimates derived by Jones & Stokes Associates.

Table G-12
Input Parameter Values for the
Truckee Meadows Subroutine

Variable	Simulation Year 1979	 1985	 2000
ppt (determined from runoff = $\frac{C(P-F)A}{12}$	C = .34762 F = .26850 inches A = 35,000 acres	C = .34524 F = .24670 inches A = 54,427 acres	C = .39888 F = .2000 inches A = 64,522 acres
Hunter H = X(M) + B	X = Prosser Creek flow M = .05 B = 300 af/mo	X = Prosser Creek flow M = .05 B = 300 af/mo	X = Prosser Creek flow M = .05 B = 300 af/mo
Tributary	Given in Assumption 3	Given in Assumption 3	Given in Assumption 3
Agricultural return	Given in Assumption 3	Given in Assumption 3	Given in Assumption 3
Agricultural diversion from tributary	Given in Assumption 2	Given in Assumption 2	Given in Assumption 2
JWPCP	Given in Assumption 7	Given in Assumption 7	Given in Assumption 7
M&I surface demand	37,238 acre-feet/yr	67,645 acre-feet/yr	125,214 acre-feet/yr
Total M&I demand	45,633 acre-feet/yr	76,645 acre-feet/yr	130,214 acre-feet/yr
Total agricultural demand	59,699 acre-feet/yr	44,877 acre-feet/yr	9,970 acre-feet/yr
Agricultural demand from tributaries[1]	9,932 acre-feet/yr	3,396 acre-feet/yr	664 acre-feet/yr

[1] Reductions in agricultural demands assumed available directly to M&I.

5. In order to maintain a static water table in the future, groundwater pumpage will decrease corresponding to the decrease in recharge.

6. Runoff from precipitation for each month is based upon the total rainfall for that month and is treated as if the rainfall occurred as a single storm. WCOG's STORM simulation is used as the basis to determine total area, runoff coefficient and amount of impervious surface for 1979. In 1985 and 2000 these three characteristics will change according to changes in land use patterns. It will be assumed that the values for 1985 and 2000 can be estimated from land use projections done by Jones & Stokes Associates.

7. The return of M&I water to the Truckee River as JWPCP effluent will be based upon consumption figures for the last 9 years. The return rates are as follows:

Month	Return Through the JWPCP (% of M&I Diversion)
January	78
February	77
March	71
April	47
May	37
June	29
July	26
August	29
September	36
October	54
November	75
December	78

Where appropriate for particular JWPCP alternatives, this discharge is not added to the river, but conveyed to the discharge location.

8. M&I water supply will be derived from tributaries, groundwater and the Truckee River. In 1985 and 2000, groundwater pumpage is assumed to decrease but the amount of tributary flow available to M&I will increase. This increase is associated with the reduction in agricultural demand on the tributaries, shown in Assumption 2.

Subroutine Format. The following is a general format for the computation of the flow at Vista given the various inputs.

1. Input Farad flow.

2. Compute Hunter Creek and tributary flow.

3. Add Hunter Creek flow to Farad flow.

4. Compute the M&I demand on tributary flow, and add this to Farad flow.

5. Input M&I surface water demand and subtract from river flow.

6. Input total agricultural demand and subtract what is supplied by tributaries to get agricultural water supplied by the Truckee River.

7. Subtract the Truckee River agricultural demand from the river flow.

8. Compute the tributary flow remaining after agricultural diversion of tributary flow.

9. Compute precipitation runoff.

10. Compute agricultural M&I return flow from the total agricultural and total M&I demand.

11. Add 8, 9, and 10 to river flow to get Vista flow.

Orr Ditch Decree diversions appear to be substantially lower than the actual diversions (an average diversion of about 4.5 acre-feet per acre per year as compared to nearly 8 acre-feet per acre per year at present). The use of the Orr Ditch Decree criteria tends to yield a greater annual average flow at Vista than is indicated in recent historical records.

Of the water diverted, part is consumptively used and part is returned to the Truckee River system. The return flows to the river were estimated from a computed water balance for the Truckee Meadows, with seasonally variable return percentages from agricultural uses and M&I uses. A groundwater recharge component was also included.

Truckee River Operating Criteria

The criteria used to divert water for use by TCID, and to manage the river to meet these diversion needs, are among the more dominant factors influencing the operation of the Truckee River system. As the largest single user of Truckee River water, the TCID has a major effect upon the operation of the system.

The operation of the system may vary in the future according to legal decisions relating to water management on the Truckee and Carson Rivers. The criteria that determine how TCID diversion rights to Truckee River water are met include irrigation demand by Newlands Project lands, the amount of water already stored in Lahontan Reservoir, and operating rules for reservoirs on the Truckee River system. The three influences on these criteria that are most likely to be affected by pending litigation are the amount of Newlands Project demands, the rate and timing of diversions to meet that demand and the uses of stored Stampede Reservoir water.

The three mixes of these variables selected for the basis of the hydrologic modeling are described as follows.

Existing Operating Criteria. In 1967 the USBR (now the WPRS) established reservoir operating criteria that set TCID's needs at 406,000 acre-feet per year, and established diversion schedules for meeting the demand. These schedules are referred to as the 406 criteria. The diversion schedules were based upon storage in Lahontan Reservoir and forecast runoff. Since 1967 the diversions into the Truckee Canal have reflected the 406,000 acre-feet demand and associated diversion criteria.

However, Judge Gesell's decision in 1973 held that the Secretary of Interior had to provide greater flows for the Pyramid Lake fishery, set the Newlands Project demand at 288,129 acre-feet, and directed the Secretary of Interior to promulgate criteria to meet that demand. The Secretary published the regulations, but TCID, which was not a party to the suit that resulted in the Gesell decision, refused to abide. The question is pending in the courts, and in the meantime, TCID has continued to divert based on a demand of up to 406,000 acre-feet per year.

Stampede Reservoir has been operated for flood control, fish and wildlife and recreation needs since its construction, with no current provision for the municipal and industrial storage that was originally intended. Since 1973, fishery releases have been made under the Gesell decision, which specifies 600 cfs from March 1 to May 15, 300 cfs May 16 to September 15, and 150 cfs September 16 to February 28. Judge Gesell's decision also allocated potential storage credits in Stampede Reservoir to TCID for agricultural use. The use of this storage arrangement has not occurred. Further, the TCWCD, SPPCo and State of Nevada have sued Interior to implement the M&I use for Stampede Reservoir. Neither of these issues involving Stampede Reservoir has been resolved to date, and the operation presently emphasizes operation to benefit the threatened and endangered fish species in the Truckee River and Pyramid Lake. It is this present situation that is embodied in the model's existing criteria.

The criteria governing the operation of the Truckee River system in the future will reflect the outcome of current litigation. It will most likely involve changes from existing conditions since each party involved in the litigation has objections to certain components of the current criteria.

Bureau of Reclamation Criteria (406). An outcome of the litigation favoring TCID and SPPCo will yield management criteria reflective of a 406,000 acre-feet per year need by TCID (referred to, for simplicity, as the 406 criteria).

One possible outcome of existing litigation could be to recognize the validity of the 406,000 acre-feet per year demand of the Newlands Project; to implement M&I uses of Stampede Reservoir; and yet to retain Judge Gesell's provision for TCID storage credits in Stampede Reservoir. Such a combination of possible outcomes is felt to represent one of the larger depletions of Truckee River water likely to result from the current actions. This combination was used as the 406 criteria in the model analysis. While not in strict accord with the 406 criteria promulgated by WPRS prior to Judge Gesell's decision, it would embody a 406,000 acre-feet per year demand for the Newlands Project and the basic WPRS diversion schedule, with provision for storage of exchange water in Stampede Reservoir.

The 406 criteria used for modeling incorporate a 6,300 acre-feet per year firm yield from Stampede Reservoir for fishery purposes. These flows were assumed to be released on a uniform year-round basis. The criteria also include an M&I component for Stampede Reservoir.

The 406 criteria would incorporate the 406,000 acre-feet per year demand and the associated diversion criteria for the Truckee Canal. One possible outcome of the current litigation is that TCID's desires to provide storage for the Newlands Project in Stampede would be approved. Therefore, under such criteria, Stampede Reservoir would be operated solely for fishery enhancement according to the original (but never executed) reservoir contract. This would include provision of 17,000 acre-feet of firm yield of Stampede Reservoir water for SPPCo M&I use. In order to reflect a condition as different as possible from the Gesell criteria, it was decided to use the original contract provisions in the 406 criteria for model purposes.

Gesell Criteria (288). The Gesell, or 288, criteria are derived from the 1973 decision of Judge Gesell that TCID's need for irrigation water should be 288,129 acre-feet per year and that Stampede Reservoir must be operated for flood control, fish and wildlife, recreation and to store water for possible use by TCID. The criteria are designed to minimize the use of Truckee River water in the Newlands Project and increase flows to Pyramid Lake to protect the endangered and threatened fish species. The Gesell decision would result in lower diversions into the Truckee Canal than in the 406 criteria, and requires specific releases from Stampede Reservoir to meet fishery needs. Those releases are 600 cfs from March 1 to May 15, 300 cfs May 16 to September 15, and 150 cfs September 16 to February 28.

The Gesell decision allocated storage for TCID exchange water in Stampede Reservoir. In order to represent a wider range in potential future conditions on the Truckee River, the input assumption was made that TCID would not have such a credit in Stampede Reservoir. Thus, the 288 criteria used for model input do not exactly follow Judge Gesell's decision. The 288 criteria and 406 criteria employed in the modeling should bracket the range of likely conditions, however, and provide an appropriate background against which to identify any JWPCP impacts.

Model Operation

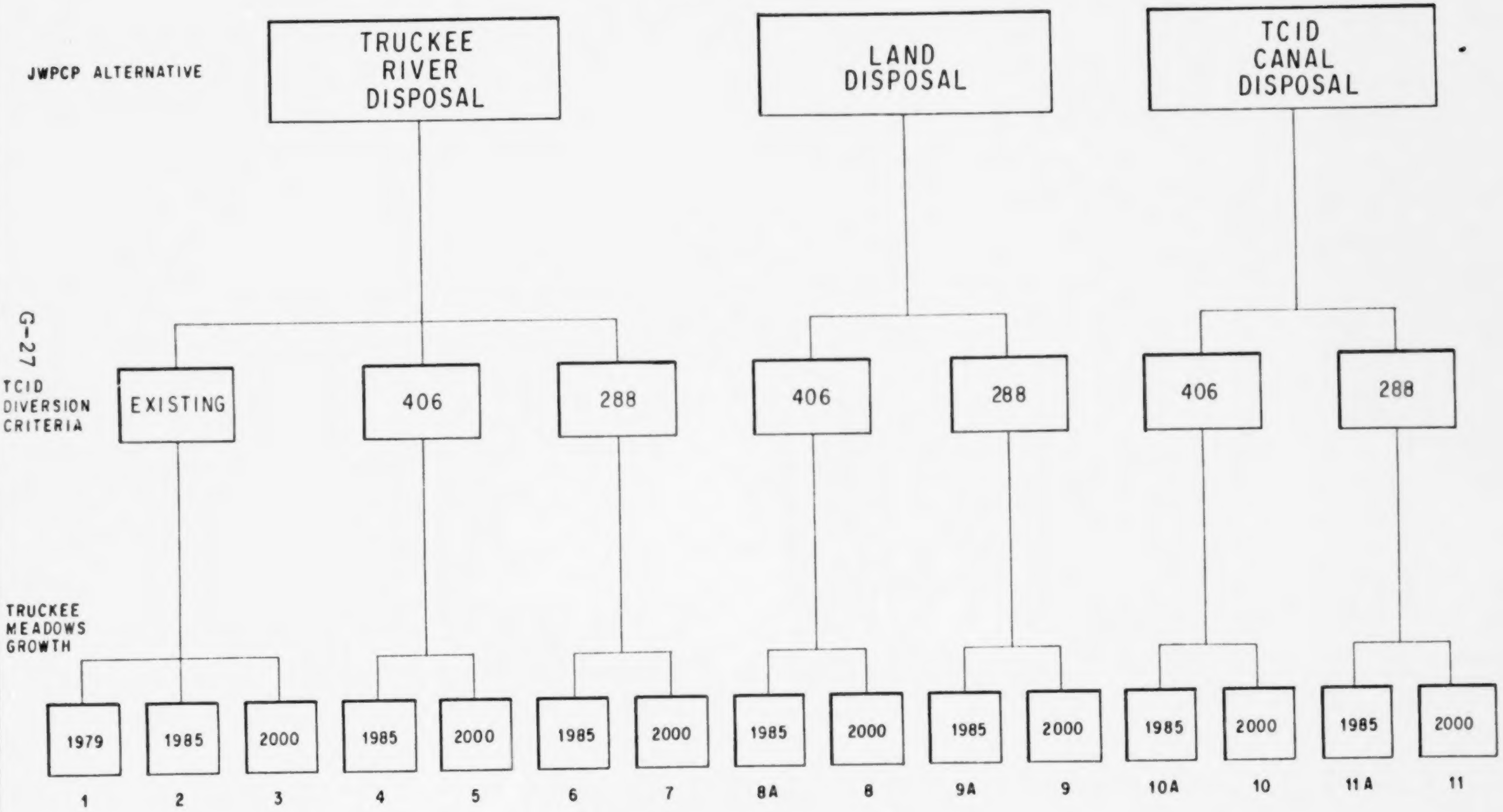
The USBR model of the Truckee River was modified to incorporate the foregoing assumptions, and operated for a series of 15 scenarios (Figure G-1). California water use was modeled only at the levels shown as maximum by the draft California-Nevada Interstate Compact, rather than at present use levels. The maximum possible difference between the two usage levels is not significant in terms of total Truckee River flows (less than 2 percent on an average annual basis) and accurate estimates of current usage are unavailable. It was decided that since the model incorporated the draft California-Nevada Interstate Compact usage levels, and since California water use is independent of growth in Nevada, that only Compact levels would be used. This assumption does not affect the JWPCP-related conclusions.

The Gesell decision provides for a TCID credit in Stampede Reservoir. It was decided to apply the 288 criteria without the TCID credit to model a wider range of potential flows on the Truckee River. Thus, the 288 criteria used in the model recognize a TCID demand of 288,129 acre-feet per year, but do not recognize TCID storage in Stampede Reservoir. A TCID credit was incorporated in the model's 406 criteria.

The model output consists of about 80 pages per run, with a tabulation for each year and a summary tabulation illustrating 75-year averages. Probability exceedence data were also tabulated for several locations on the Truckee River, and are the basis for the flow duration curves presented in the EIS.

Figure G-1

DIAGRAM OF SCENARIOS
JWPCP HYDROLOGIC IMPACT ANALYSIS



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Model conclusions are presented in the EIS. Copies of the 75-year summary sheets are presented for each scenario on the following pages, preceded by a revised matrix showing the assumptions embodied in each run (Table G-13).

Model Output Analysis

Analyses were made for four basic time frames: mean annual flow; mean monthly flow (flow-duration probability relationships); once in 10-year low, mean monthly flows; and the major drought periods (annual or monthly, as appropriate). Each analysis provides insight into the relative response of the river to any change in the amount or location of effluent disposal from the JWPCP. When only one input assumption is changed between scenarios, it is possible to compare the resulting change in river flow and thus identify a possible cause/effect relationship.

Model output analysis is presented in the text of the report with the exception of the monthly flow duration curves, which are included herewith (Figure G-2 through G-17). They show probability of equalling or exceeding given flow values for Vista and the inlet to Pyramid Lake for March, June, August, and November each year.

TABLE G-13

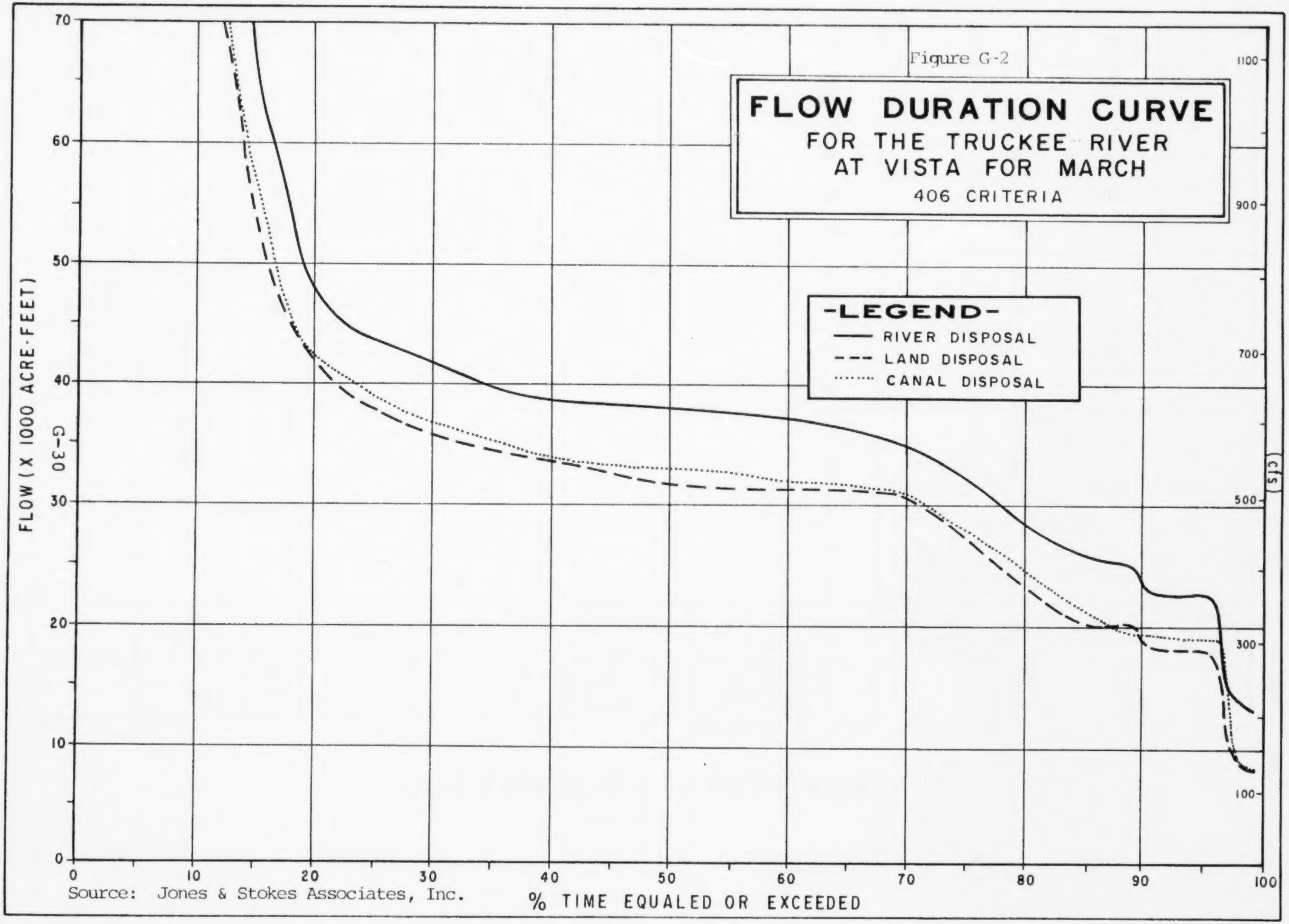
SCENARIOS EVALUATED

SCENARIO	JWPCP DISPOSAL OPTION			TRUCKEE MEADOWS URBANIZATION			CALIFORNIA WATER USE		TCID DIVERSION CRITERIA			
	TRUCKEE RIVER	LAND	TCID CANAL	1978	1985	2000	PRESENT	PER COMPACT	EXISTING CONDITION	BUREC (406)	GESELL (288)	CARSON LITIG. OUTCOME
1	●			●				●	●			
2	●				●			●	●			
3	●					●		●	●			
4	●				●			●		●		
5	●					●		●		●		
6	●				●			●			●	
7	●					●		●			●	
8A		●			●			●		●		
8		●				●		●		●		
9A		●				●		●		●		
9		●				●		●			●	
10A			●		●			●		●		
10			●			●		●		●		
11A			●		●			●			●	
11			●			●		●			●	

Source: Jones & Stokes Associates, Inc.

Figure G-2

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR MARCH
406 CRITERIA



Source: Jones & Stokes Associates, Inc.

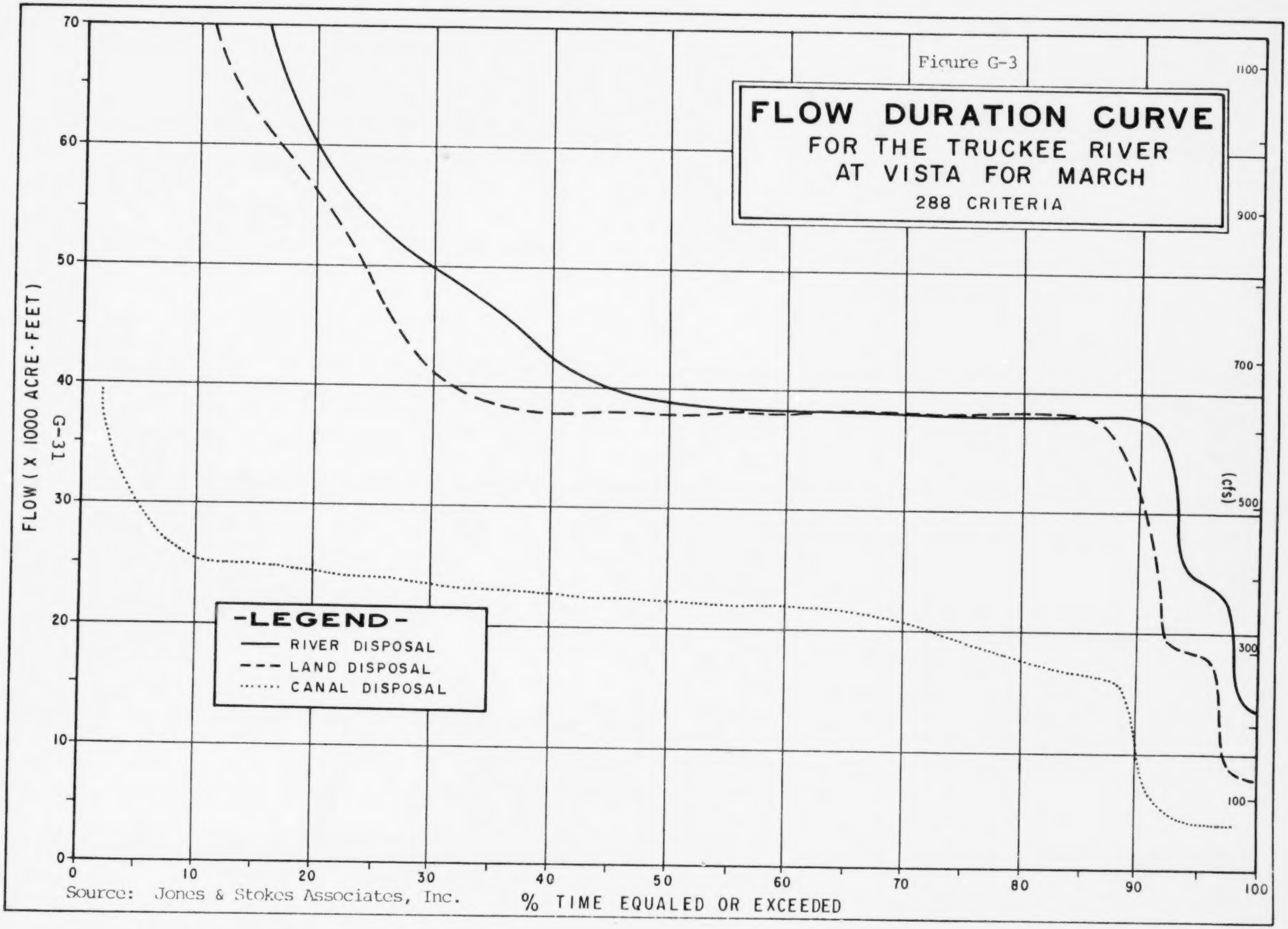


Figure G-3

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR MARCH
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

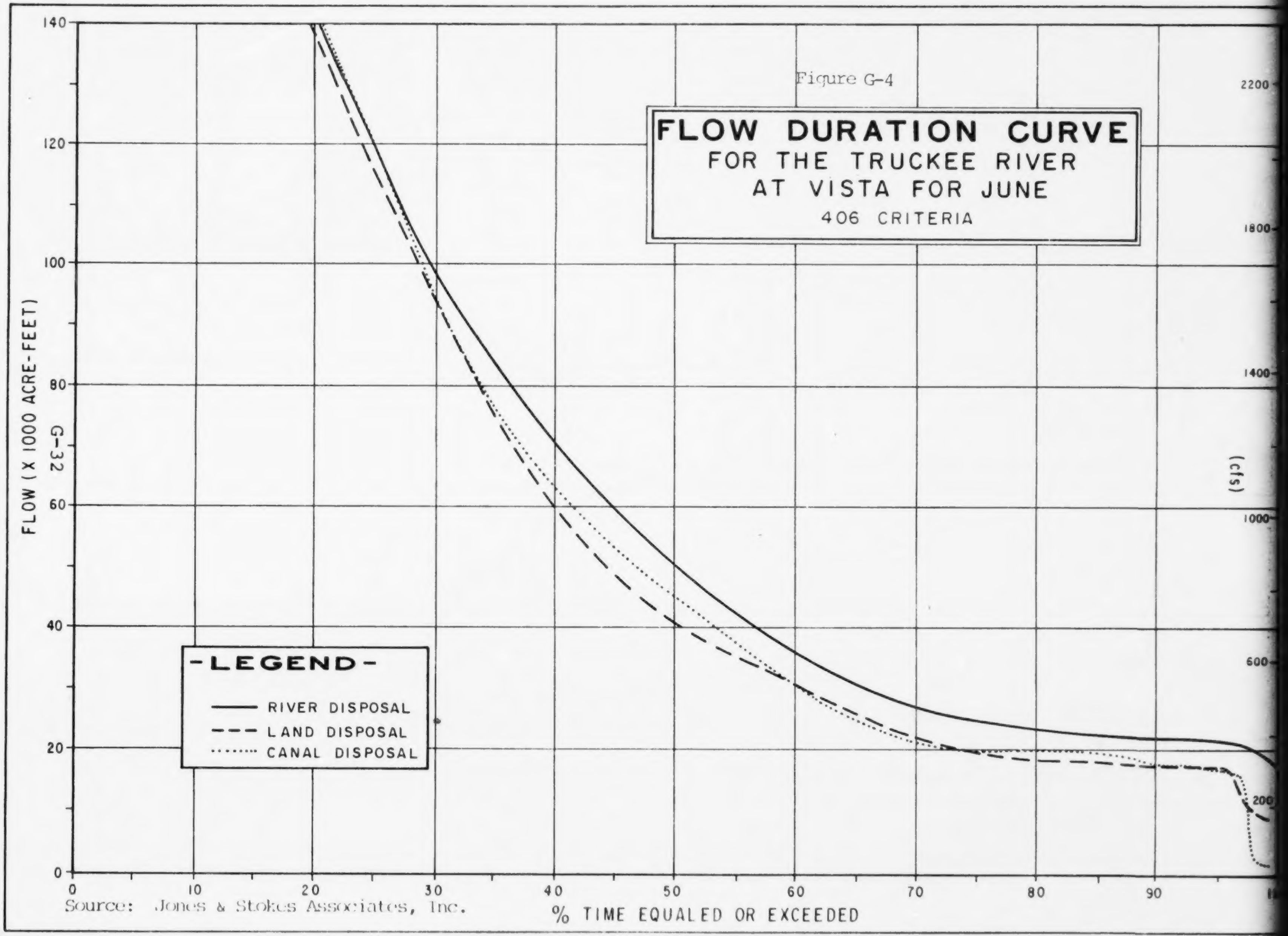
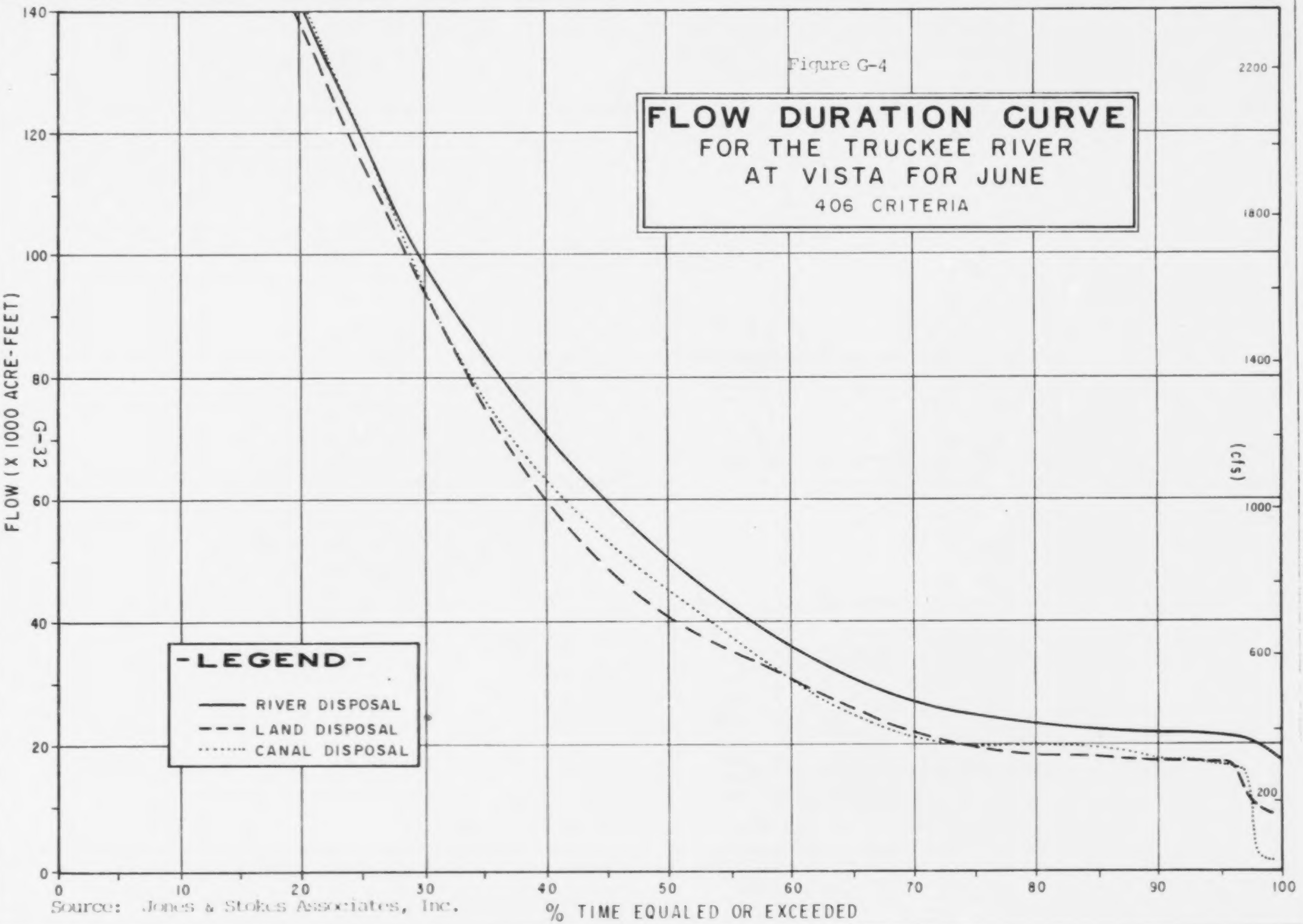


Figure G-4

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR JUNE
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

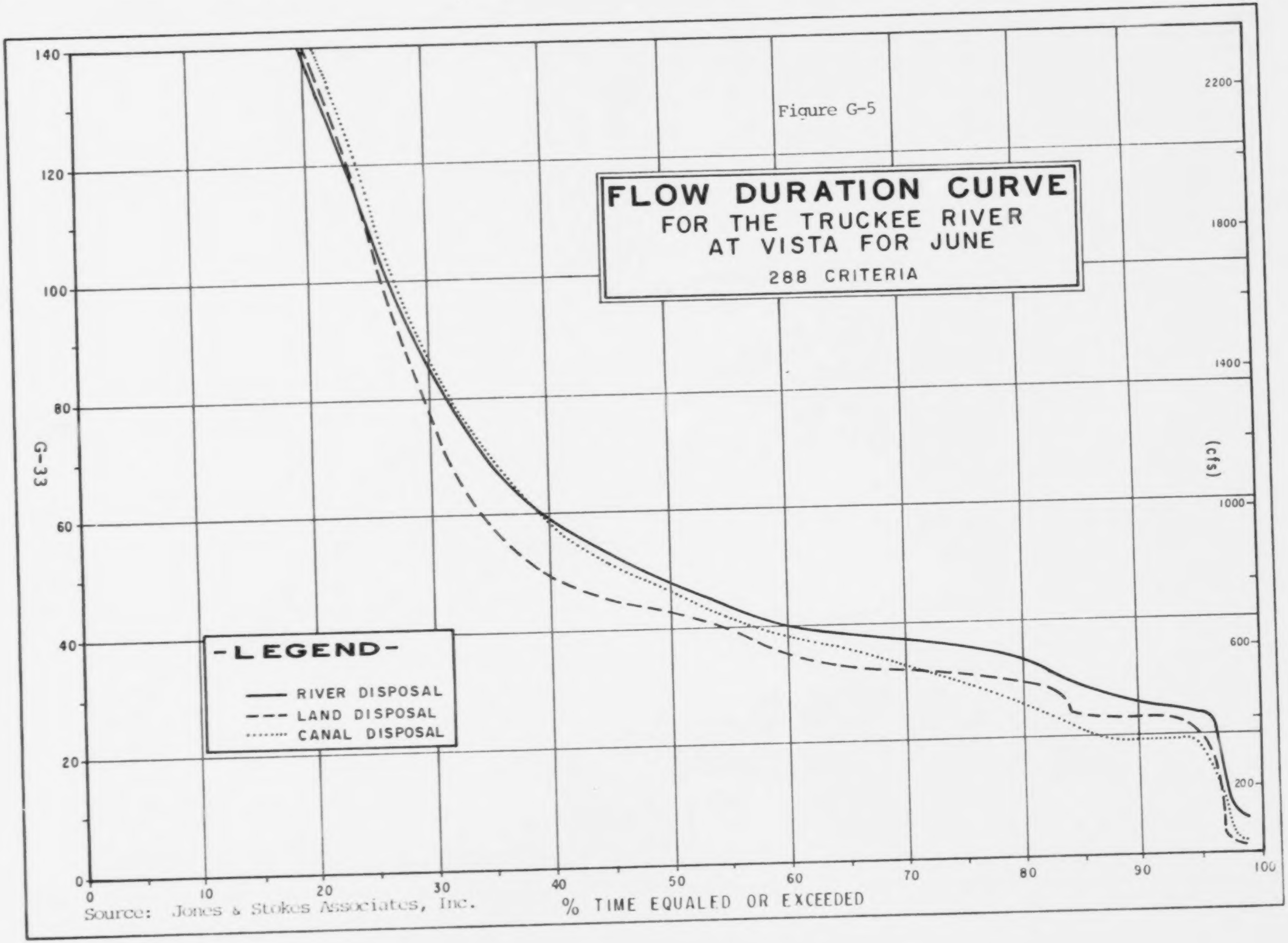
Figure G-4



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR JUNE
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

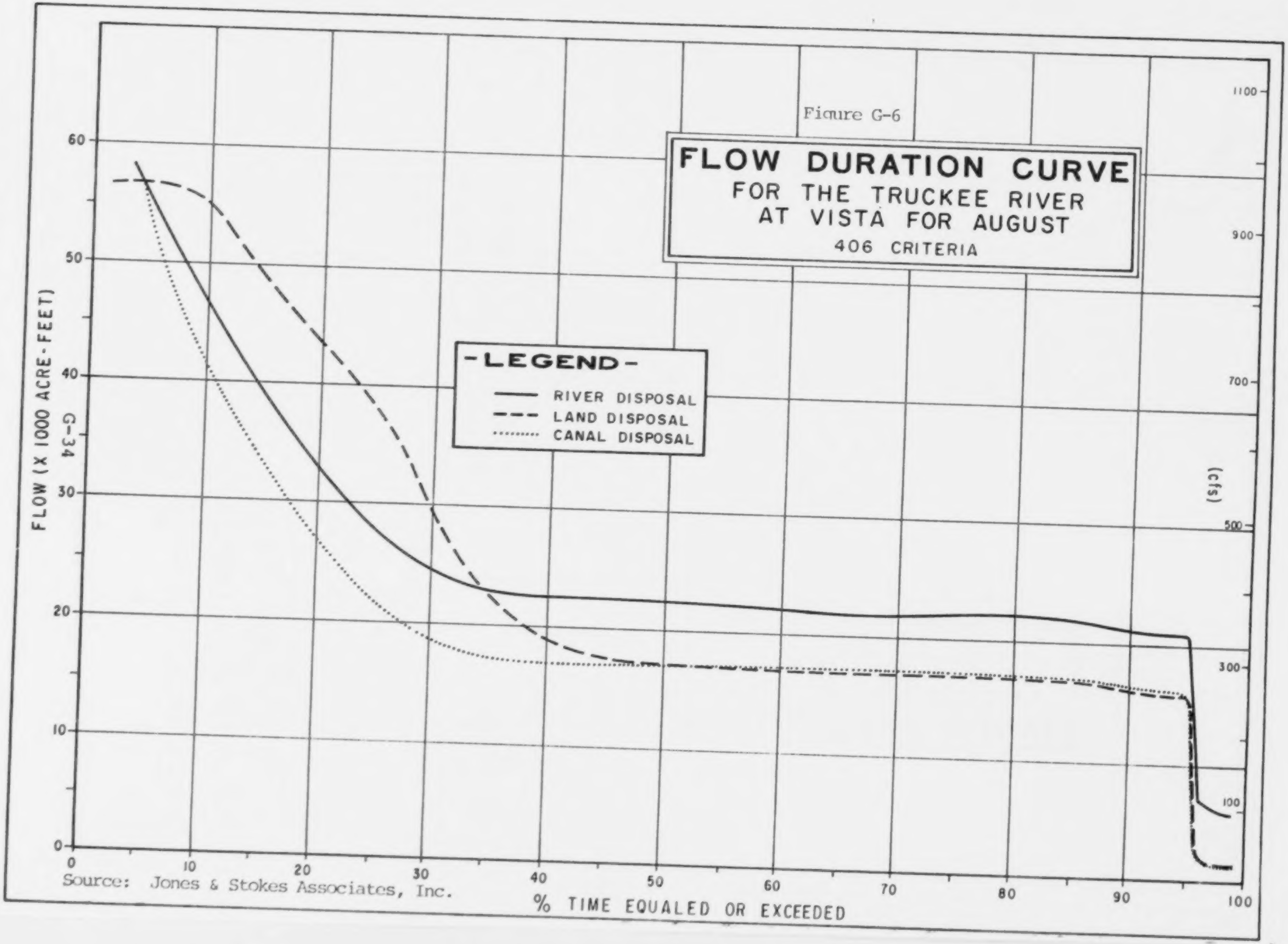
Figure G-5



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR JUNE
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

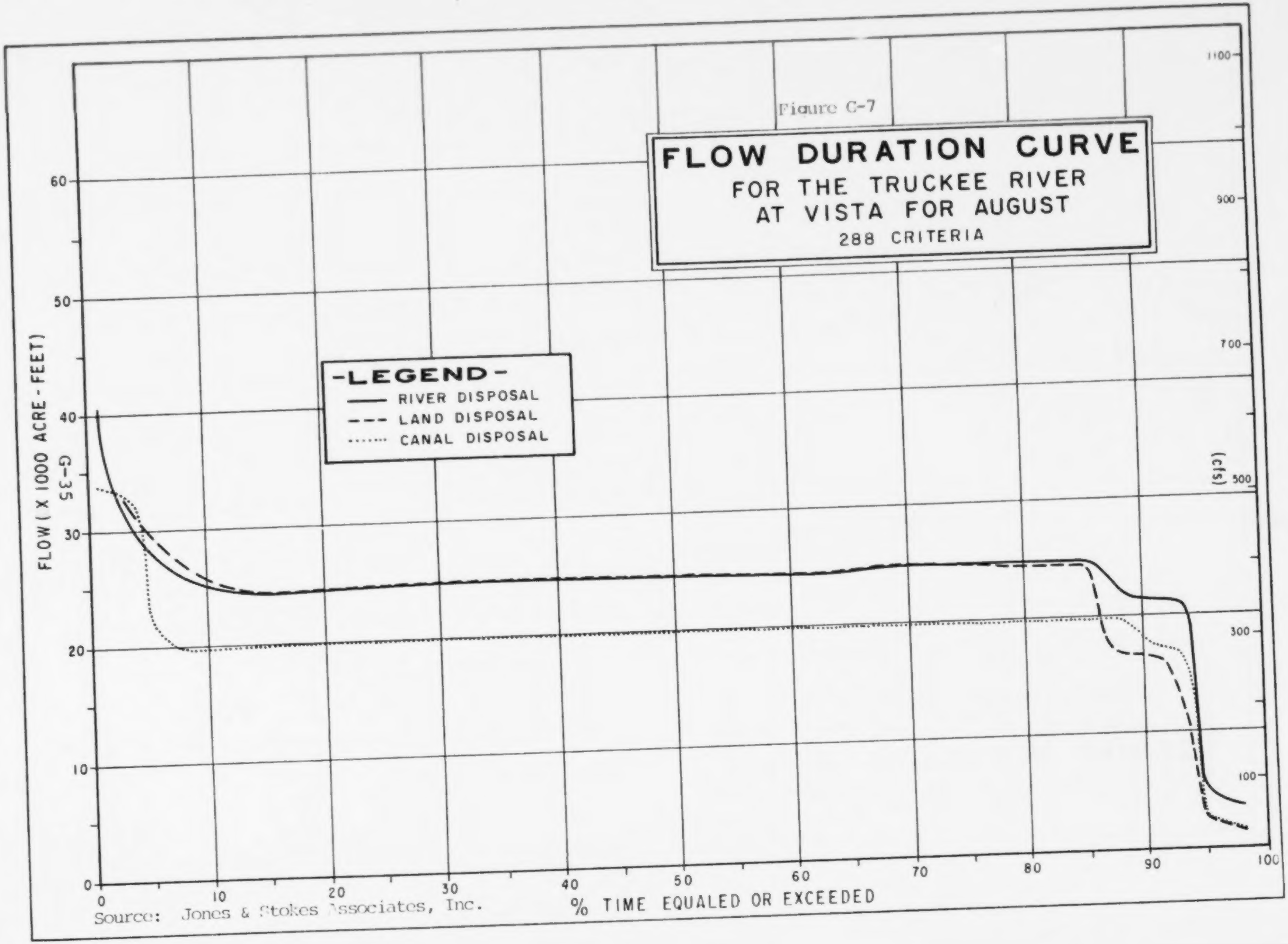
Figure G-6



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR AUGUST
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

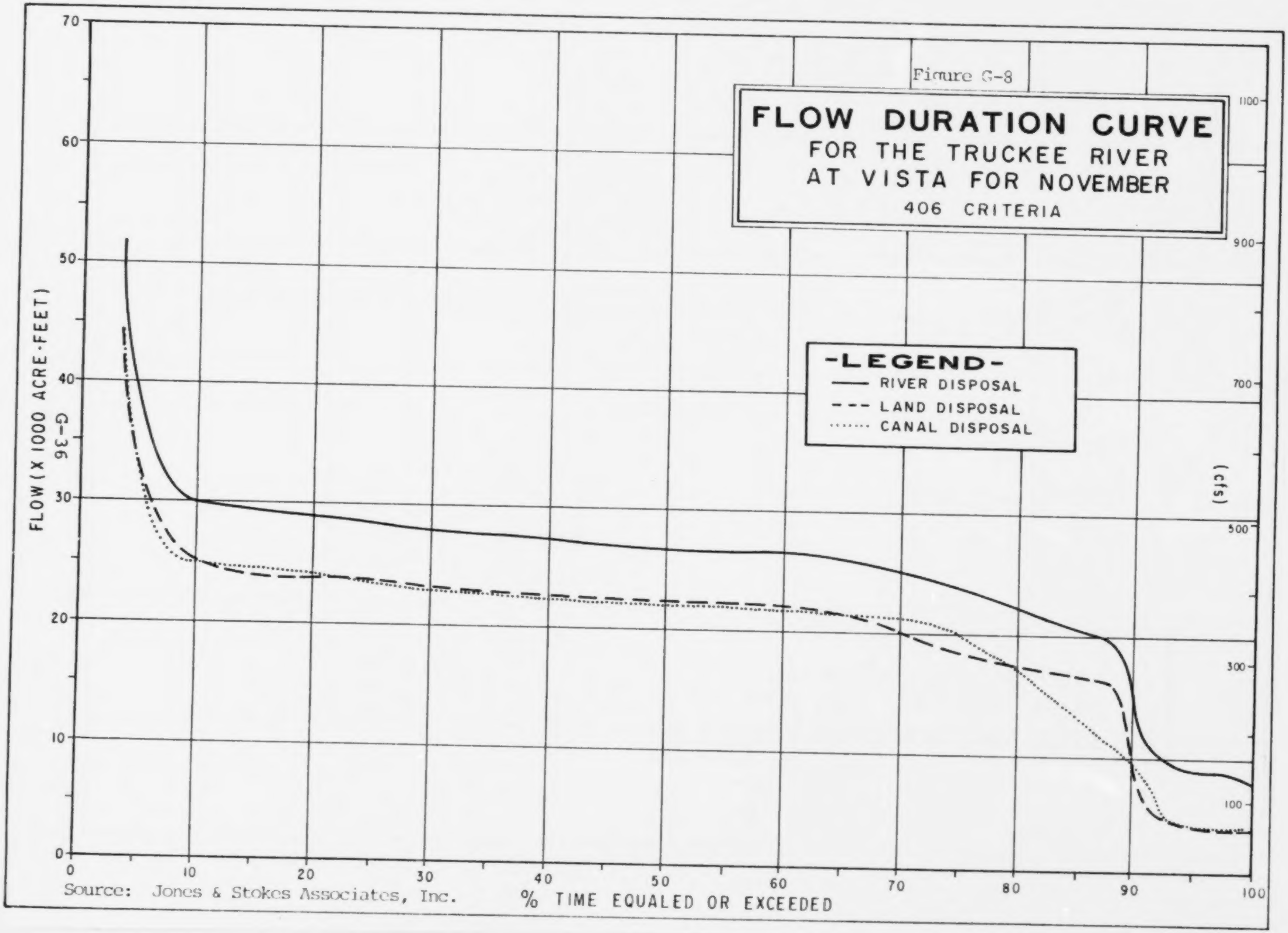
Figure G-7



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR AUGUST
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

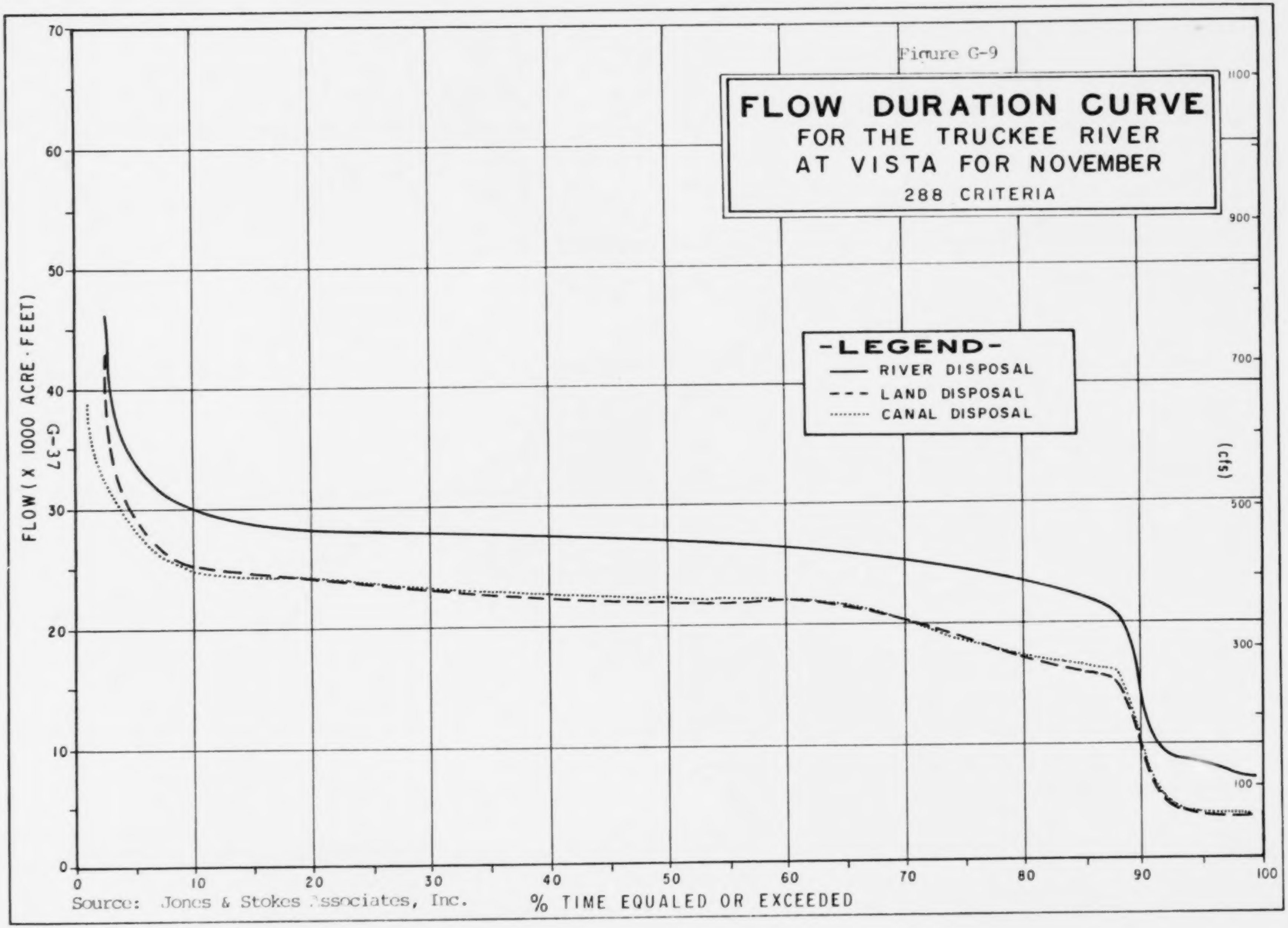
Figure G-8



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR NOVEMBER
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

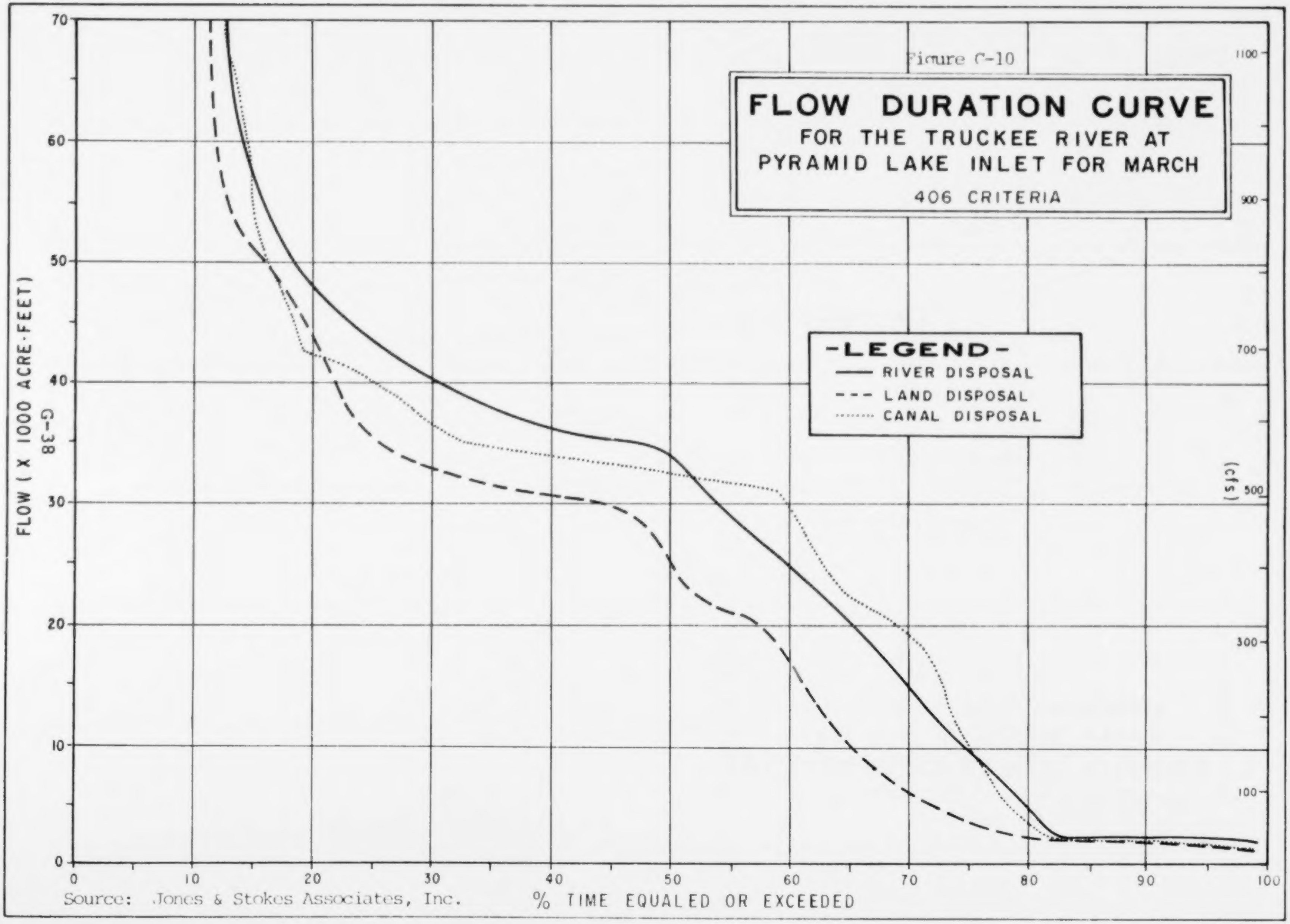
Figure G-9



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR NOVEMBER
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

Figure C-10



FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR MARCH
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

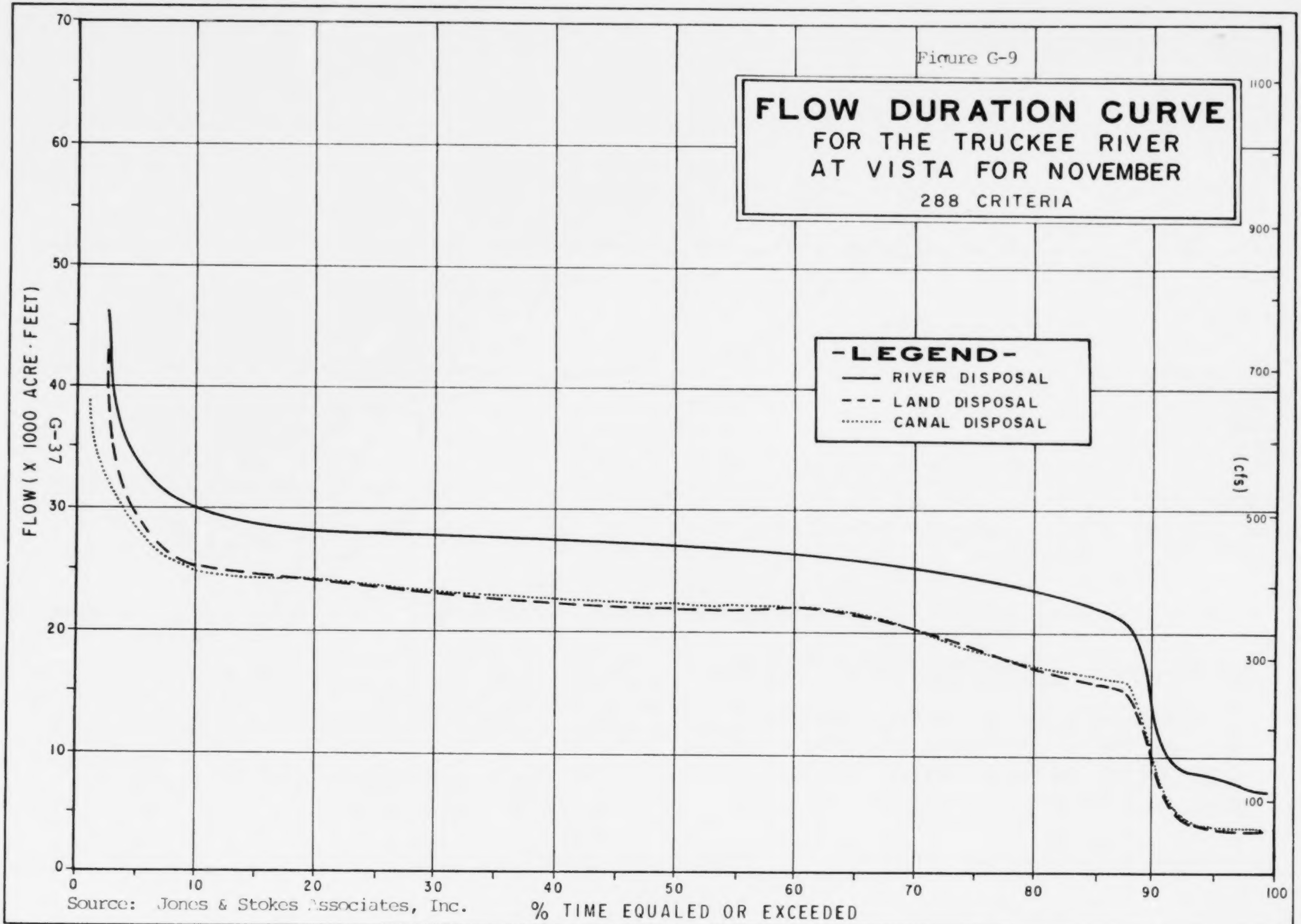


Figure G-9

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER
AT VISTA FOR NOVEMBER
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

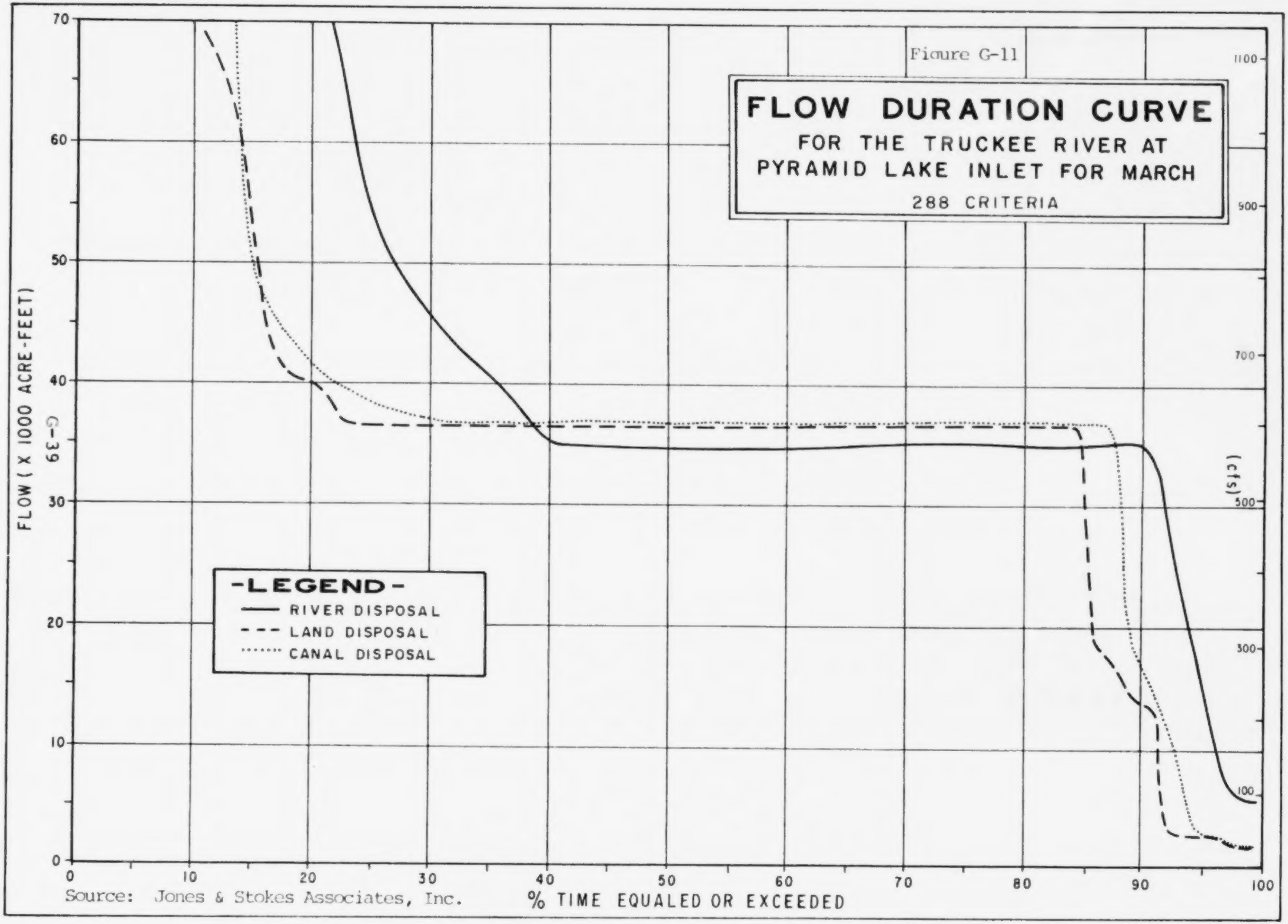


Figure G-11

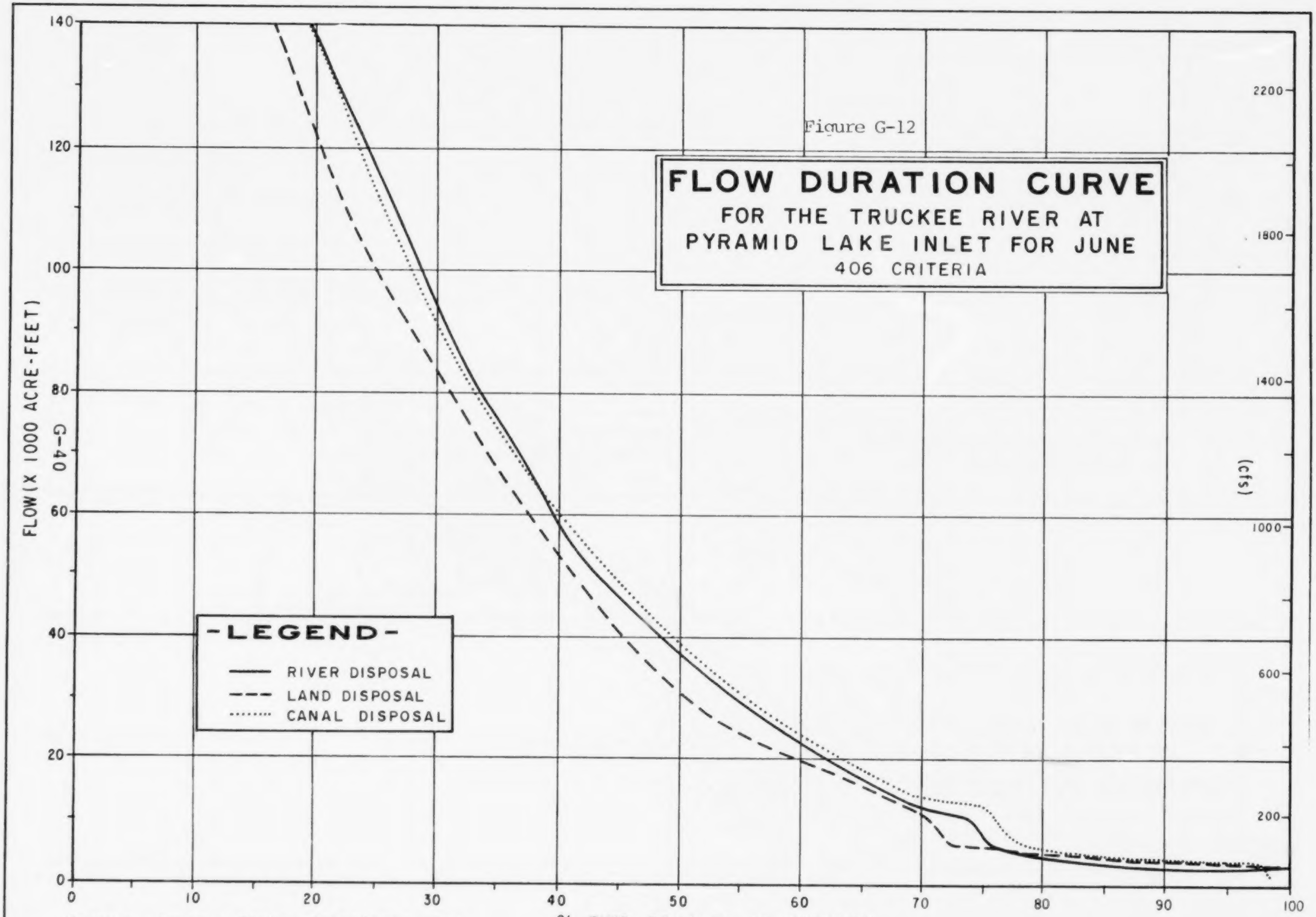
FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR MARCH
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

Figure G-12

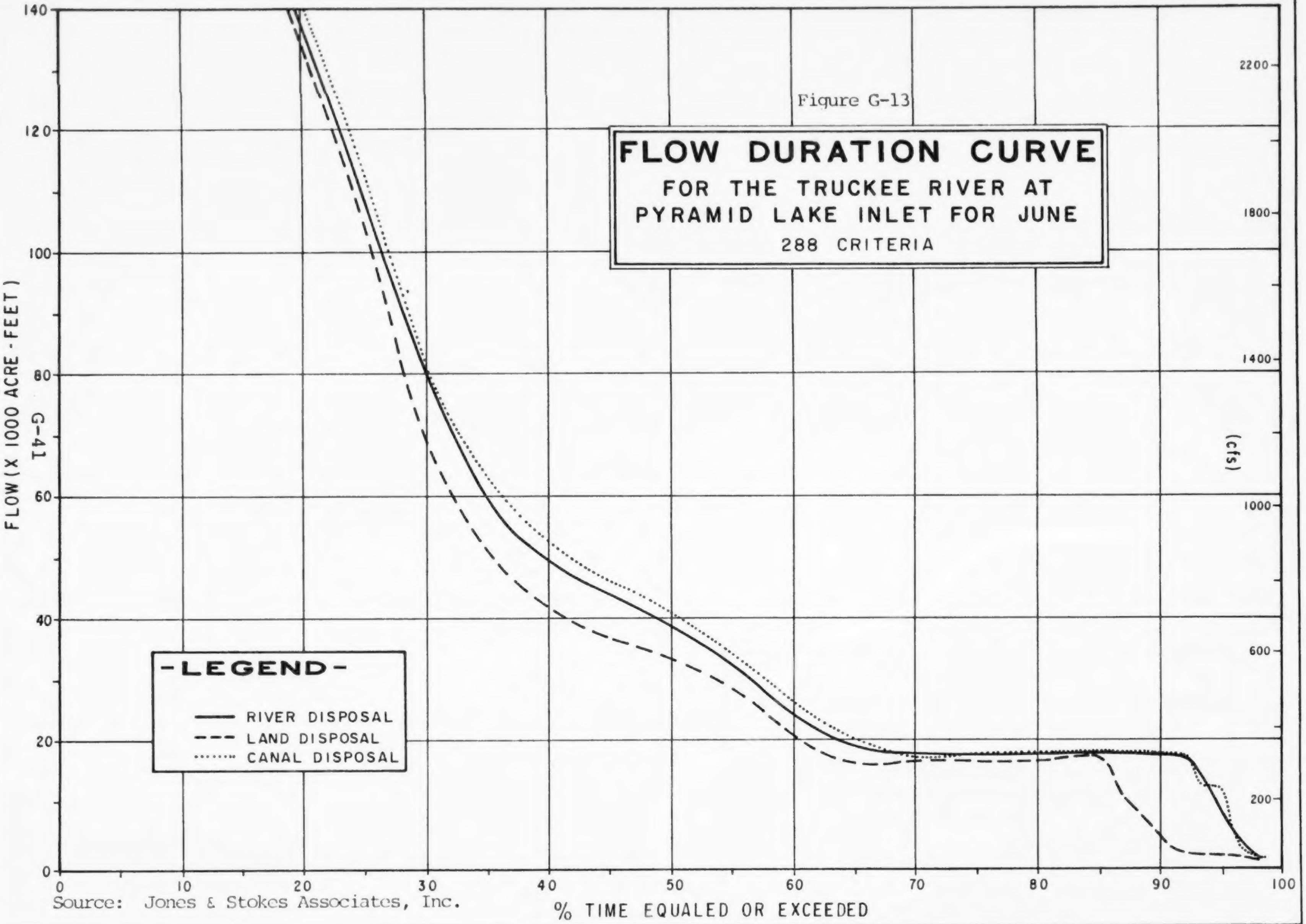
FLOW DURATION CURVE

FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR JUNE
406 CRITERIA



Source: Jones & Stokes Associates, Inc.

Figure G-13



FLOW DURATION CURVE

FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR JUNE
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

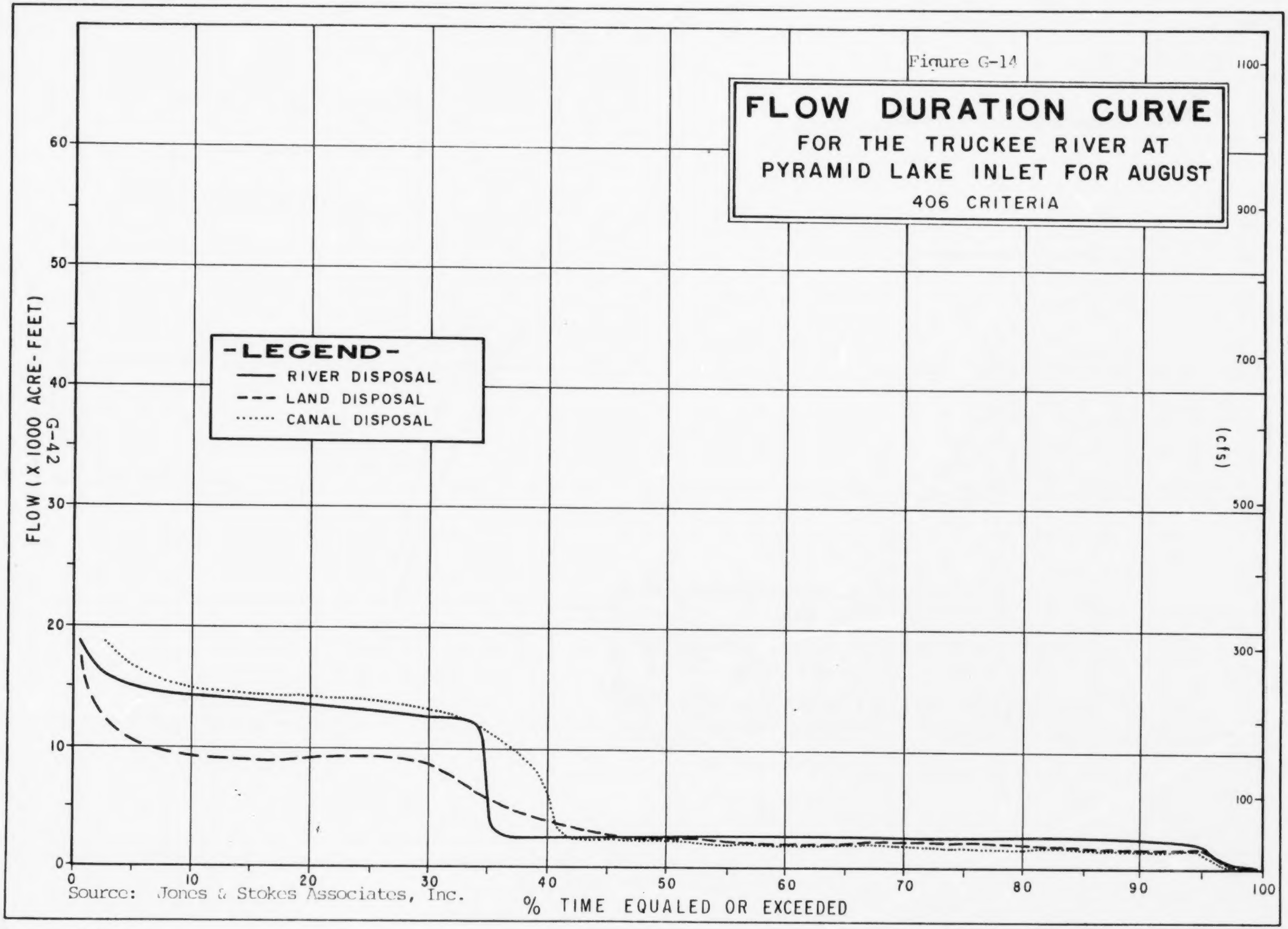
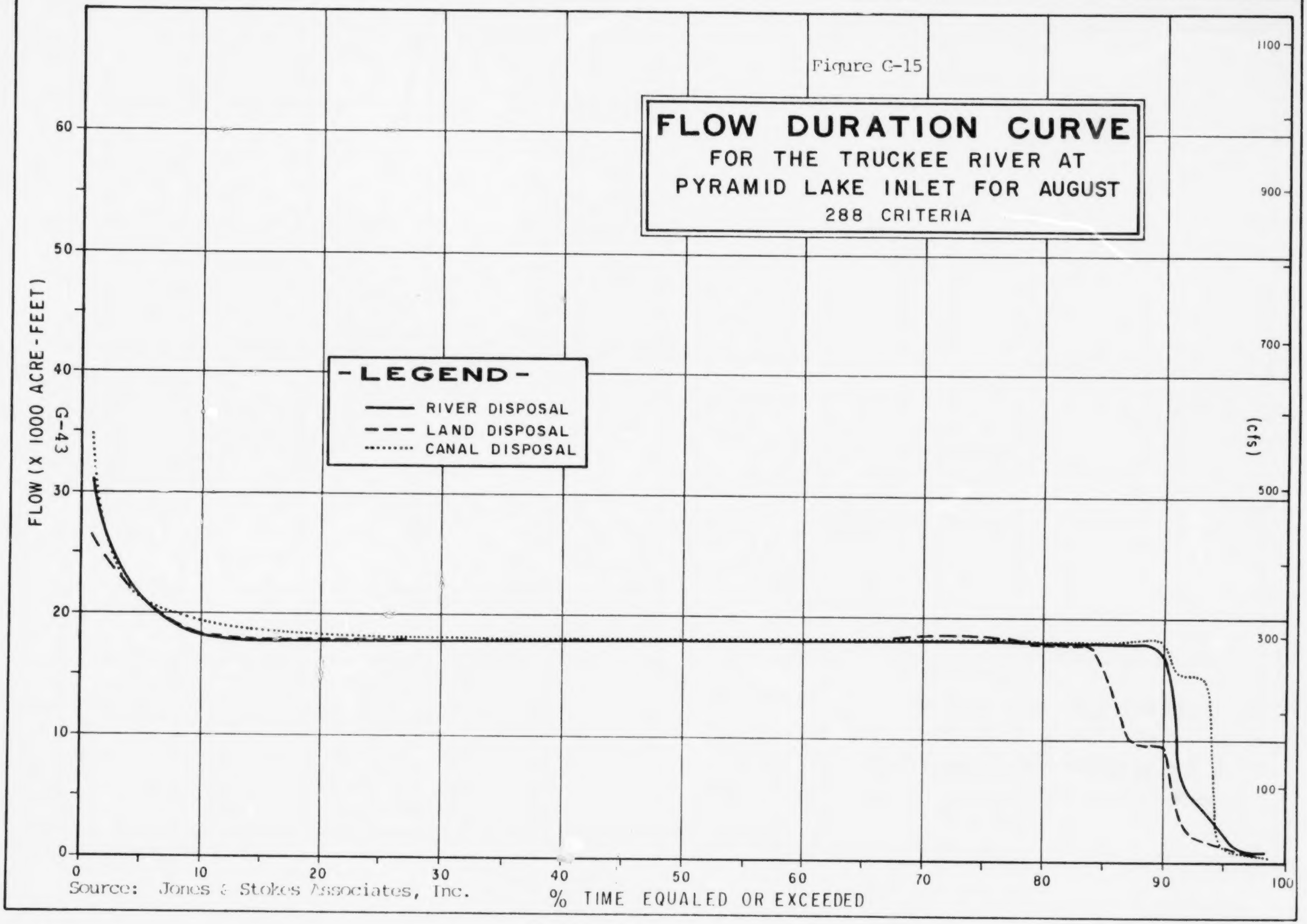


Figure G-14

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR AUGUST
406 CRITERIA

Source: Jones & Stokes Associates, Inc.

Figure G-15

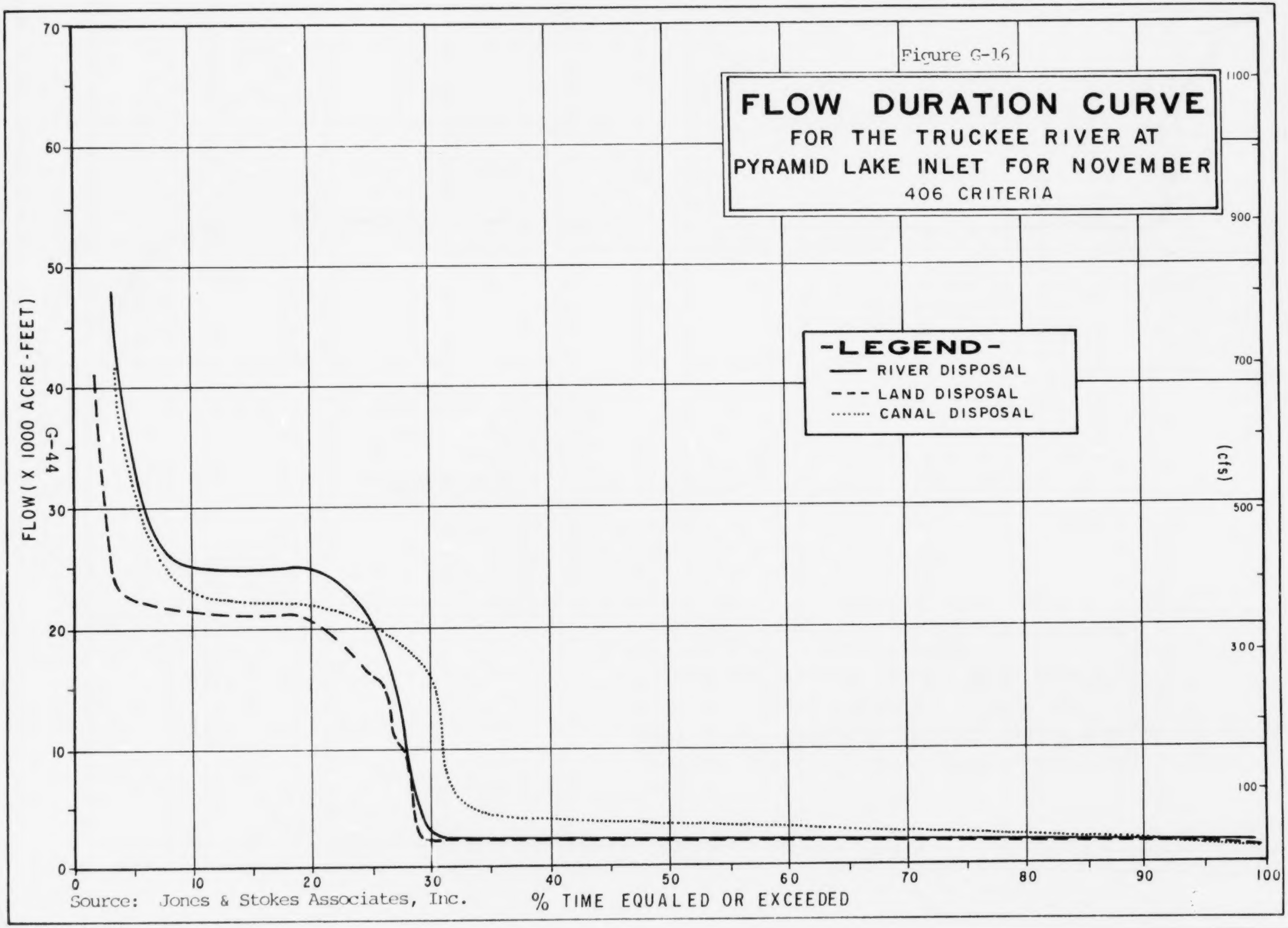


FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR AUGUST
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

Figure G-16

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR NOVEMBER
406 CRITERIA



Source: Jones & Stokes Associates, Inc.

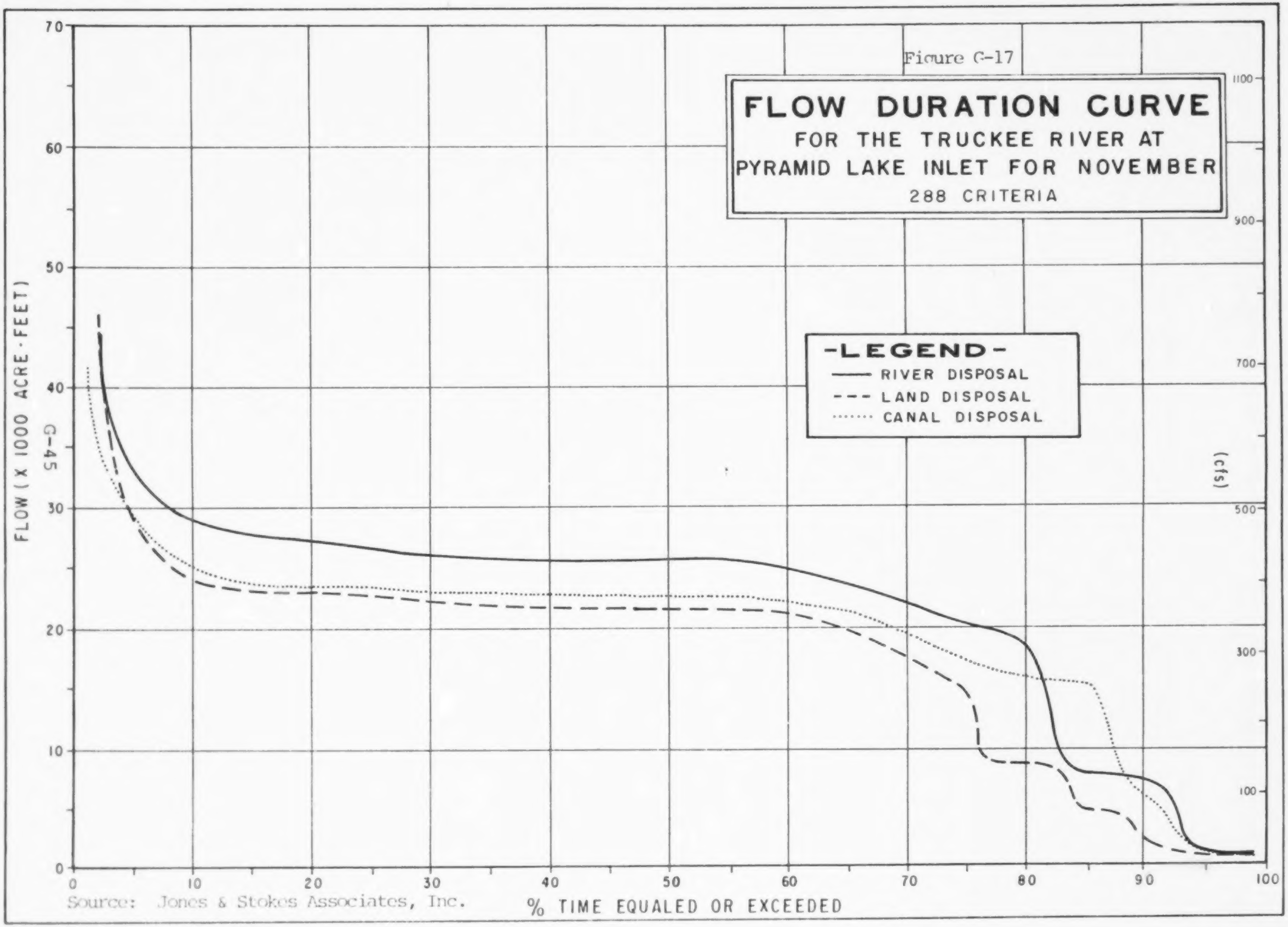


Figure G-17

FLOW DURATION CURVE
FOR THE TRUCKEE RIVER AT
PYRAMID LAKE INLET FOR NOVEMBER
288 CRITERIA

Source: Jones & Stokes Associates, Inc.

Run Number 1. Truckee River Disposal, 1978 Truckee Meadows Urbanization, Existing TCID Diversion Criteria

```
1901-1975 [illegible]                  [illegible] AVERAGES                                      75 YEAR GRAND TOTAL

                              OCT   NOV   DEC   JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP  TOTAL
   [illegible]                [illegible]                                       1.19   .86   .25   .20   .51   31.1      2335.85
LAKE T[illegible]             [illegible]                                             -3.5 -34.4 -42.4  142.9     13716.10
           RELEASE            [illegible]                                              6.7  11.8  13.1   42.8      6462.82
           [illegible]          .0    .1    .0  [illegible]                             .0    .0    .0     .0          .00
           SPILL                .1  [illegible]                                        [illegible] .0   .0   80.9      6064.48
   CONTENT [illegible]        [illegible]                                            541.1 500.9 444.9   ---
PROSSER [illegible]           [illegible]                                              3.6   1.2   1.0   65.0      4677.50
           RELEASE            [illegible]                                              4.7   4.0   2.4   37.0      2817.00
           EVAPORATION          .1    .1    .0  [illegible]                             .4    .1    .1    1.0       120.10
           SPILL                .2    .0  [illegible]                                   .0    .0    .0   25.5      1913.50
   CONTENT [illegible]        [illegible]                                             16.1  10.9   9.4   ---
STAMPEDE RESERVOIR [illegible] [illegible]                                             3.8   1.5   1.8  129.1      9682.40
           RELEASE            [illegible]                                              4.6  11.6   5.2  105.5      7910.48
           EVAPORATION          .4    .4    .1  [illegible]                            1.2   1.1    .7    6.4       481.00
           SPILL                .2    .0    .0  [illegible]                             .7    .0    .0   14.4      1074.64
   CONTENT [illegible]        [illegible]                                            112.4 101.2  95.9   ---
TOTAL [illegible]             [illegible]                                             10.6  11.6   5.2  122.0      9151.02
           RELEASE            [illegible]                                             10.0  14.5   7.7  106.9      8020.10
           EVAPORATION          .1    .1    .1  [illegible]                             .4    .3    .2    2.1       154.50
           SPILL                .2    .0    .0  [illegible]                             .8    .0    .0   12.4       935.92
   CONTENT [illegible]        12.0  [illegible] 11.1 [illegible]                      10.8  15.6  12.9   ---
OTHER FLOW [illegible]        [illegible]                                             14.6   6.2   2.8  209.1     15681.50
TRUCKEE RIVER AT FARAD        [illegible]                                             45.3  39.5  31.2  555.3     41650.32
FLOW AT VISTA                 [illegible]                                             46.7  34.5  27.4  584.4     43828.04
TRUCKEE RIVER AT [illegible]  [illegible]                                             40.2  34.0  27.1  581.0     43636.61
BY-PASS AT [illegible]        [illegible]                                             22.2  13.3  10.6  355.1     26634.74
[illegible]                   [illegible]                                             23.0  15.1  12.2  379.3     28447.07
DIVERSION INTO TR.CANAL       [illegible]                                             19.0  20.6  15.4  226.7     17002.01
DIVERSION FROM TR.CANAL       [illegible]                                              6.6   6.3   4.4   39.5      2964.12
SHORTAGE-TRUCKEE DIVISION       .0    .0    .0  [illegible]                             .2    .2    .0     .5        36.18
TERMINAL TR.CANAL FLOW        [illegible]                                              7.4  10.1   4.4  154.0     11556.24
WEST FORK INFLOW              [illegible]                                              6.1   2.7   1.6   81.0      6077.50
EAST FORK INFLOW              [illegible]                                             25.5   8.7   5.5  280.4     21028.50
           RELEASE              .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
           EVAPORATION          .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
           SPILL              [illegible]                                             25.5   8.7   5.5  280.4     21028.50
   CONTENT [illegible]          .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0   ---
SHORTAGE-WEST FORK-[illegible]  .1    .0    .0    .0    .0    .0    .0    .0  [illegible]  1.2   2.5   2.4    6.4       478.55
SHORTAGE-WEST FORK-[illegible]  .1    .0    .0    .0    .0    .0    .0    .0    .5   2.6   4.6   4.4   12.1       908.54
SHORTAGE-EAST FORK [illegible]  .0    .0    .0    .0    .0    .0    .0    .0    .4   4.9   9.4   9.3   23.0      1726.56
SHORTAGE-[illegible]            .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .1    .2     .3        23.67
PROJ [illegible](CARSON VALLEY) .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
OUTFLOW (CARSON VALLEY)       [illegible]                                             14.4   3.2   2.1  317.2     23786.60
SHORTAGE(C.V. - [illegible])    .0    .0    .0    .0    .0    .0    .0    .0    .1    .4   2.7   2.4    6.0       447.30
[illegible](C.V.-[illegible])   .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
TOTAL [illegible]             [illegible]                                             24.4  12.1   9.0  451.1     33833.19
           RELEASE            [illegible]                                             50.5  57.1  37.4  356.0     26698.82
           EVAPORATION        [illegible]                                              7.7   5.1   2.6   54.8      4113.30
           SPILL              [illegible]                                               .2    .0    .0   37.4      2838.79
   CONTENT [illegible]        [illegible]                                            227.5 176.8 145.4   ---
TCID CREDIT [illegible]         .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
CARSON RIVER [illegible]        .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
SHORTAGE-[illegible]          [illegible] .0    .0    .0    .0    .0    .0    .0    .4   2.5   2.4   2.0   10.0       751.18
PROJECT [illegible]             .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0          .00
ORIGINAL [illegible]            .1    .0    .0    .0    .0    .0    .0    .0    .2   1.2   2.5   2.4    6.4       478.55
SHORTAGE TO [illegible]VALLEY   .0    .0    .0    .0    .0    .0    .0   1.1   7.7  16.6  15.2  [illegible] 41.8  3137.66
TRUCKEE [illegible]           [illegible]                                             31.5  26.5  18.4  476.4     35731.04
[illegible] DEFICIT             .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0    .0     .0         5.63
[illegible] DEFICIT             .0    .0    .0    .0    .0    .0    .0    .0    .0    .2    .4    .1    1.1        87.42
```

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Run Number 2. Truckee River Disposal, 1985 Truckee Meadows Urbanization, Existing TCID Diversion Criteria

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1901-1975  STUDY PERIOD                               MONTHLY AND ANNUAL AVERAGES                              75 YEAR GRAND TOTAL

                            OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP   TOTAL
       TAHOE CITY PRECIP    1.62   3.48   5.42   6.28   5.22   4.30   2.09   1.19    .64    .25    .26    .51   31.1      2335.85
LAKE TAHOE-NET INFLOW     -31.0   -3.1   25.6   37.6   36.1   32.8   43.0   76.4   52.0   -3.5  -38.4  -42.9  182.9     13716.10
            RELEASE        11.4    9.3    8.2    7.9    5.9    5.5    4.2    4.2    4.7    6.7   12.0   13.1   93.1      6980.54
            EVAPORATION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
            SPILL            .0     .0     .1    2.5    2.2    5.8   10.2   26.4   27.7    5.9     .0     .0   80.7      6051.76
   CONTENT END OF MONTH   393.0  370.6  395.9  423.3  451.6  473.0  501.5  547.4  567.0  550.9  500.5  444.4   ---
PROSSER RESERVOIR INFLOW    1.5    2.2    3.6    3.4    3.5    5.5   11.7   17.8   10.2    3.4    1.2    1.0   65.0      4877.50
            RELEASE         1.6    1.9    2.4    2.3    2.1    2.9    2.3    1.0    2.1    8.7    8.1    2.4   37.6      2821.20
            EVAPORATION      .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1    1.5       114.50
            SPILL            .7     .5    1.2    1.1    1.3    2.1    4.0    8.7    5.2     .6     .0     .0   25.4      1909.90
   CONTENT END OF MONTH     8.2    6.1    8.2    8.2    3.3    6.8   14.1   22.0   24.5   18.1   10.9    9.4   ---
STAMPEDE RESERVOIR INFLO    3.9    3.9    7.9    6.5    6.4   11.2   22.3   35.9   20.2    5.0    1.5    1.6  129.1      9682.40
            RELEASE         8.2    7.2    6.3    5.0    4.6   14.1   16.8    9.6    7.7    9.8   11.8    5.4  106.4      7980.76
            EVAPORATION      .3     .2     .1     .1     .1     .3     .3     .8    1.0    1.2    1.1     .7    6.2       467.90
            SPILL            .6     .0     .0     .5     .2     .5    2.4    5.0    3.7     .7     .0     .0   13.6      1023.76
   CONTENT END OF MONTH    95.6   82.0   93.5   89.3   85.8   82.3   98.1  108.3  116.1  109.5   98.1   93.7   ---
TOTAL INFLOW BOCA RESERVOR  8.9    7.3    6.4    5.7    4.9   14.8   19.7   15.2   11.6   10.5   11.8    5.4  122.2      9165.41
            RELEASE         8.7    8.6    5.9    4.8    3.9   13.5   15.3    9.0    6.4   10.3   14.2    8.0  107.7      8081.00
            EVAPORATION      .1     .1     .1     .1     .1     .1     .1     .2     .3     .3     .3     .2    2.0       149.90
            SPILL            .5     .0     .0     .5     .3     .5    1.7    4.7    2.9     .7     .0     .0   11.8       893.99
   CONTENT END OF MONTH    11.4   10.2   10.5   10.9   11.5   12.2   14.7   16.9   18.9   18.0   15.3   12.4   ---
OTHER FLOW ABOVE FARAD      4.6    5.9    4.2    9.6    9.4   16.1   33.3   50.5   35.6   13.6    6.2    6.8  209.1     15681.50
TRUCKEE RIVER AT FARAD     26.9   25.2   25.4   27.4   29.3   47.6   75.3  102.7   83.6   45.5   39.6   31.6  555.6     41669.91
FLOW AT VISTA              27.4   30.1   31.7   36.7   32.5   56.5   78.0  102.4   82.7   34.5   33.3   27.1  577.8     43333.28
TRUCKEE RIVER AT DERBY     27.4   30.1   31.7   36.7   32.5   56.5   77.8  101.8   82.3   34.9   32.8   26.8  575.2     43142.05
BY-PASS AT DERBY DAM        6.0    7.0   16.3   25.4   21.5   39.7   52.1   78.4   59.0   21.7   13.1   10.2  350.4     26277.94
INFLOW TO PYRAMID LAKE      8.2    8.7   17.6   26.4   22.5   41.0   56.0   81.6   62.5   23.4   14.9   11.8  374.5     28091.22
DIVERSION INTO TR.CANAL    21.4   23.1   15.3   11.3   11.0   16.7   25.7   23.4   23.3   17.2   19.7   16.6  224.9     16864.10
DIVERSION FROM TR.CANAL     3.3    1.4     .0     .0     .0    1.7    3.8    5.5    6.6    6.6    6.3    4.4   39.5      2962.51
SHORTGE-TRUCKEE DIVISION     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .2     .0     .5        37.79
TERMINAL TR.CANAL  FLOW    15.4   19.5   14.0   10.3   10.0   13.1   18.7   14.9   13.5    6.6    9.2    8.4  152.9     11468.99
WEST FORK INFLOW            1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   15.2    6.1    2.7    1.6   81.0      6077.50
EAST FORK INFLOW            5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4     21028.50
            RELEASE          .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
            EVAPORATION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
            SPILL           5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4     21028.50
   CONTENT END OF MONTH      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0   ---
SHORTGE-WESTFORK-CALIF       .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4       478.55
SHORTGE-WESTFORK-NEVADA      .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4   12.1       908.54
SHORTGE-EAST FORK LANDS      .0     .0     .0     .0     .0     .0     .0     .0     .4    3.9    9.4    9.3   23.0      1726.56
SHORTAGE-BELOW JUNCTION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3        23.87
PROJ DPLTN(CARSN VALLY)      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
OUTFLOW (CARSON VALLEY)     4.8   10.3   17.6   21.3   21.7   26.3   41.8   81.6   67.6   18.9    3.2    2.1  317.2     23786.60
SHORTAGE(C.V. - LAHTN)       .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4    6.0       447.30
PROJ DPLTN(C.V.-LAHTN)       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
TOTAL INFLOW TO LAHTN      18.4   26.6   31.6   31.7   31.8   38.7   56.6   88.8   74.3   23.7   11.2    9.1  449.4     33705.89
            RELEASE        27.3   12.9     .0     .0     .0   15.0   35.0   49.9   59.7   60.4   57.7   37.5  355.4     26657.53
            EVAPORATION     1.3     .7     .8     .9    1.0    4.5    8.0   11.7   10.4    7.7    5.0    2.5   54.3      4075.20
            SPILL            .0     .6    1.1     .5    1.1    2.6    4.7   13.7   13.3     .2     .0     .0   37.2      2790.89
   CONTENT END OF MONTH   129.8  144.[illegible] 174.6  204.4  234.6  251.2  260.1  274.6  269.7  225.0  173.5  142.6   ---
TCID CREDIT IN STAMPEDE      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
CARSON RIVER CREDIT          .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
SHORTGE-CARSON DIVISION     2.6     .3     .0     .0     .0     .0     .0     .0     .4    2.5    2.4    2.3   10.5       792.47
PROJECT DPLTN OF AREA1       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
ORIGINAL SHORTAGE-AREA1      .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4       478.55
SHORTAGE IN CARSN VALLY      .2     .1     .0     .0     .0     .0     .0     .0    1.1    7.7   16.6   16.2   41.8      3137.66
TRUCKEE [illegible] RENO   18.8   22.8   22.8   25.7   21.9   43.3   59.4   91.3   70.3   30.2   25.1   18.4  461.4     34605.99
[illegible] DEFICIT          .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .0     .2        18.75
TM AG DEFICIT                .4     .0     .0     .0     .0     .0     .0     .0     .1     .2     .4     .2    1.3        98.08
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Run Number 3. Truckee River Disposal, 2000 Truckee Meadows Urbanization, Existing TCID Diversion Criteria

1901-1975 STUDY PERIOD

MONTHLY AND ANNUAL AVERAGES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	75 YEAR GRAND TOTAL
TAHOE CITY PRECIP	1.62	3.38	5.42	6.28	5.22	4.40	2.08	1.14	.64	.25	.26	.51	31.1	2335.85
LAKE TAHOE-NET INFLOW	-31.0	-5.1	25.6	37.6	35.1	32.8	43.0	76.4	52.0	-3.5	-38.4	-42.9	182.9	13716.19
RELEASE	11.4	7.6	8.3	7.6	5.9	5.5	4.2	4.2	4.7	6.8	12.2	13.2	93.5	7011.81
EVAPORATION	.0	.0	.0	.0	.0	.6	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	.0	.0	.1	2.5	2.0	5.6	10.1	26.3	27.1	5.9	.0	.0	80.3	6020.49
CONTENT END OF MONTH	392.1	377.6	394.9	422.4	450.0	472.2	500.8	546.8	565.5	550.3	499.7	443.6	---	
PROSSER RESERVOIR INFLOW	1.5	2.2	3.5	3.4	3.5	5.5	11.7	17.8	16.2	3.4	1.2	1.0	65.0	4877.50
RELEASE	1.6	1.4	2.4	2.3	2.1	2.9	2.3	1.0	2.1	8.6	8.1	2.4	37.7	2824.46
EVAPORATION	.1	.1	.0	.0	.0	.1	.1	.2	.3	.4	.3	.1	1.5	114.50
SPILL	.0	.4	1.2	1.1	1.3	2.1	4.0	8.7	5.2	.8	.0	.0	25.4	1906.64
CONTENT END OF MONTH	8.2	9.1	8.2	8.2	8.3	6.8	14.1	22.0	24.5	18.1	10.9	9.4	---	
STAMPEDE RESERVOIR INFLOW	3.9	3.4	7.4	6.5	6.4	11.2	25.3	35.6	20.2	5.0	1.5	1.6	129.1	9682.40
RELEASE	2.0	7.2	6.3	5.0	4.5	14.4	16.7	9.5	7.7	10.2	12.2	5.7	107.5	8061.87
EVAPORATION	.3	.2	.1	.1	.1	.2	.3	.7	1.0	1.1	1.0	.7	6.1	455.50
SPILL	.5	.0	.0	.5	.2	.5	2.1	4.4	3.5	.7	.0	.0	12.8	958.19
CONTENT END OF MONTH	42.0	39.4	60.0	80.8	82.3	78.4	84.7	105.2	113.2	106.3	94.5	89.7	---	
TOTAL INFLO BOCA RESERVOIR	8.6	7.4	6.4	5.6	4.9	15.1	19.4	14.8	11.4	11.0	12.2	5.7	122.4	9180.96
RELEASE	8.7	5.3	5.9	4.9	4.0	14.0	15.8	8.0	6.8	10.5	14.3	8.4	109.1	8186.23
EVAPORATION	.1	.1	.1	.1	.1	.1	.1	.2	.3	.3	.3	.2	1.9	144.30
SPILL	.2	.0	.0	.4	.3	.5	1.6	4.4	3.7	.7	.0	.0	10.8	813.72
CONTENT END OF MONTH	11.0	9.9	10.3	10.6	11.1	11.6	13.7	16.0	17.4	17.3	14.4	12.0	---	
OTHER FLOW ABOVE FARAD	4.8	5.5	8.2	9.6	9.4	19.1	38.3	50.5	35.6	13.6	6.2	8.8	209.1	15681.50
TRUCKEE RIVER AT FARAD	26.6	25.2	25.3	27.8	24.2	48.2	75.2	102.2	83.0	45.7	39.4	32.0	555.9	41694.85
FLOW AT VISTA	27.3	29.4	30.8	35.8	31.6	55.8	76.8	102.3	81.4	37.1	31.8	27.0	567.1	42534.14
TRUCKEE RIVER AT DERBY	27.3	29.4	30.8	35.8	31.6	55.8	76.7	101.8	81.0	36.6	31.3	26.7	564.0	42342.91
BY-PASS AT DERBY DAM	5.8	9.7	15.7	24.4	20.5	38.9	51.3	77.8	58.2	20.7	13.0	9.9	342.8	25713.06
INFLOW TO PYRAMID LAKE	6.0	9.8	16.9	25.4	21.4	40.2	55.2	81.1	61.7	22.3	14.7	11.5	367.0	27526.53
DIVERSION INTO TR.CANAL	21.4	22.7	15.2	11.3	11.1	16.9	25.4	24.0	22.7	15.4	18.3	16.8	221.7	16629.85
DIVERSION FROM TR.CANAL	3.3	1.6	.0	.0	.0	1.7	3.8	5.5	6.0	6.6	6.3	4.4	39.5	2959.67
SHORTGE-TRUCKEE DIVISION	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.2	.0	.5	40.63
TERMINAL TR.CANAL FLOW	15.4	13.5	13.8	10.3	10.1	13.2	18.4	15.4	12.9	5.4	8.0	8.6	150.0	11251.28
WEST FORK INFLOW	1.6	2.3	3.0	2.7	2.9	4.2	12.9	24.8	16.2	6.1	2.7	1.6	81.0	6077.50
EAST FORK INFLOW	5.0	7.0	9.5	10.4	11.3	15.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
RELEASE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	5.0	7.0	9.5	10.4	11.3	15.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
CONTENT END OF MONTH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	
SHORTGE-WESTFORK-CALIF	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTGE-WESTFORK-NEVADA	.1	.0	.0	.0	.0	.0	.0	.0	.5	2.6	4.6	4.4	12.1	908.54
SHORTGE-EAST FORK LANDS	.0	.0	.0	.0	.0	.0	.0	.0	.4	3.4	4.4	4.3	23.0	1726.56
SHORTAGE-BELOW JUNCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.3	23.07
[illegible](CARSN VALLEY)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
OUTFLOW (CARSON VALLEY)	4.8	11.4	17.6	21.4	21.7	26.3	41.6	81.6	67.6	18.4	3.2	2.1	317.2	23786.60
SHORTAGE(C.V. - [illegible])	.0	.0	.0	.0	.0	.0	.0	.0	.1	.8	2.7	2.4	6.0	447.30
[illegible](C.V.-[illegible])	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
TOTAL INFLOW TO LAHONTAN	18.5	20.1	31.4	31.7	31.9	36.8	56.2	90.4	77.8	22.5	10.0	9.3	446.5	33488.18
RELEASE	27.1	[illegible]	.0	.0	.0	15.0	35.0	49.3	59.5	60.4	57.6	37.1	354.4	26579.31
EVAPORATION	1.3	[illegible]	.7	[illegible]	1.0	4.5	7.4	11.6	10.2	7.6	4.9	2.4	53.6	4022.90
SPILL	.0	.0	.8	[illegible]	1.0	2.0	4.6	13.3	14.1	.2	.0	.0	36.0	2703.70
CONTENT END OF MONTH	126.1	140.8	170.7	201.0	230.9	247.7	256.5	272.1	267.1	221.3	168.8	138.5	---	
TCID CREDIT IN STAMPEDE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
CARSON RIVER CREDIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SHORTGE-CARSON DIVISION	2.6	.3	.0	.0	.0	.0	.0	.0	.6	2.5	2.6	2.8	11.6	870.69
PROJECT [illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
ORIGINAL SHORTAGE-[illegible]	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTAGE IN CARSON VALLEY	.2	.0	.0	.0	.0	.0	.0	.0	1.1	7.7	16.8	16.2	41.8	3137.66
TRUCKEE [illegible]	18.2	14.4	20.1	22.4	19.1	[illegible]	66.8	90.4	[illegible]	24.0	24.0	18.5	439.5	32961.55
M.F.T DEFICIT	.0	.1	.0	.0	.0	.0	.0	.0	.1	.4	.5	.1	1.6	125.94
TM AV DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1	.3	24.26

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Run Number 4. Truckee River Disposal, 1985 Truckee Meadows Urbanization, 406 Criteria

1901-1975 [illegible] MONTHLY AND ANNUAL AVERAGES 75 YEAR GRAND TOTAL

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	
TAHOE CITY PRECIP	1.65	3.38	5.42	6.20	5.22	4.40	2.09	1.14	.86	.25	.26	.51	31.1	2335.85
LAKE TAHOE NET INFLOW	-11.8	-3.1	25.1	27.6	29.1	36.6	43.0	71.4	47.0	-1.5	-38.4	-42.9	182.9	13716.10
RELEASE	7.3	8.4	7.7	8.0	6.0	5.7	4.3	4.3	4.5	6.1	9.5	10.5	82.4	6177.47
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	.0	.0	.1	3.1	2.8	7.3	11.0	31.0	29.9	6.2	.0	.0	91.4	6854.83
CONTENT END OF MONTH	421.3	407.4	425.7	452.2	475.5	[illegible]	517.0	566.2	585.8	570.0	522.1	468.7	---	
PROSSER RESERVOIR INFLOW	1.5	2.2	3.6	3.4	3.5	5.5	11.7	17.6	10.2	3.4	1.2	1.0	65.0	4877.50
RELEASE	1.5	1.4	2.2	2.3	2.1	2.4	2.2	1.0	2.0	8.6	7.6	2.2	35.5	2669.60
EVAPORATION	.1	.1	.0	.0	.0	.1	.1	.2	.3	.4	.3	.1	1.5	122.70
SPILL	1.1	.4	1.4	1.1	1.3	2.5	4.1	8.8	5.3	.9	.0	.0	27.2	2038.30
CONTENT END OF MONTH	8.6	8.5	8.5	8.5	8.7	9.1	14.4	22.2	24.7	18.2	11.5	10.1	---	
STAMPEDE RESERVOIR INFLO	3.9	3.9	7.9	6.5	6.4	11.2	25.3	35.6	20.2	5.0	1.5	1.6	129.1	9682.40
RELEASE	7.1	3.7	4.7	4.3	3.9	5.1	3.3	2.1	4.1	3.9	7.0	9.3	57.0	4317.72
EVAPORATION	.5	.4	.2	.2	.2	.5	.6	1.3	1.6	1.4	1.8	1.3	10.7	800.10
SPILL	5.5	.3	1.9	1.3	1.1	3.1	11.0	17.7	10.7	1.2	.0	.0	57.4	4344.68
CONTENT END OF MONTH	167.2	165.7	167.7	168.3	169.5	172.1	182.4	196.9	201.6	194.7	192.5	183.5	---	
TOTAL INFLOW BOCA RESERVOIR	16.7	9.0	8.6	5.7	5.1	8.5	14.9	20.3	13.1	5.2	7.0	9.3	117.0	8623.30
RELEASE	12.3	5.5	5.0	4.2	3.0	3.3	1.3	.3	1.6	4.5	12.1	15.2	69.4	5203.65
EVAPORATION	.1	.1	.1	.1	.1	.1	.2	.3	.4	.5	.4	.3	2.8	207.60
SPILL	4.1	.2	1.2	1.3	1.1	2.6	8.1	15.1	9.5	1.4	.0	.0	44.9	3371.55
CONTENT END OF MONTH	17.4	16.4	15.3	15.5	15.4	16.6	21.9	28.4	30.3	29.5	23.9	17.8	---	
OTHER FLOW ABOVE FARAD	4.2	5.9	8.2	9.6	7.4	16.1	35.3	50.5	35.6	13.6	6.2	8.8	204.1	15681.50
TRUCKEE RIVER AT FARAD	40.3	27.2	26.0	29.0	25.0	41.6	60.5	110.3	87.7	40.1	34.5	30.0	550.2	41266.90
FLOW AT VISTA	40.7	27.1	31.3	37.9	33.2	50.4	71.2	109.9	88.7	33.8	28.0	31.5	571.6	42881.60
TRUCKEE RIVER AT DERBY	[illegible]	27.1	31.3	37.9	33.2	50.4	71.1	109.4	86.3	33.3	27.5	31.1	564.2	42690.37
BY-PASS AT DERBY DAM	7.6	8.3	24.1	30.6	25.2	38.7	55.8	97.8	71.6	17.7	5.8	9.2	393.2	29492.60
INFLOW TO PYRAMID LAKE	9.6	10.3	24.7	31.2	26.6	39.7	58.4	99.6	73.9	19.2	7.5	10.8	411.2	30841.67
DIVERSION INTO TR.CANAL	28.6	13.2	7.3	7.3	7.1	11.7	15.3	11.6	14.7	15.6	21.7	21.9	176.0	13147.56
DIVERSION FROM TR.CANAL	4.3	1.4	.0	.0	.0	[illegible]	3.8	4.5	4.7	6.7	6.4	4.4	39.5	2981.69
SHORTGE-TRUCKEE DIVISION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.2	18.63
TERMINAL TR.CANAL FLOW	17.6	14.6	6.6	6.6	6.4	8.6	9.2	4.1	5.7	5.1	11.1	13.5	109.3	8195.57
WEST FORK INFLOW	1.6	2.3	3.0	2.7	2.9	4.2	12.9	24.8	16.2	6.1	2.7	1.6	81.0	6077.50
EAST FORK INFLOW	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
RELEASE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
CONTENT END OF MONTH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	
SHORTGE-WESTFORK-CALIF	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTGE-WESTFORK-NEVADA	.1	.0	.0	.0	.0	.0	.0	.0	.5	2.6	4.6	4.4	12.1	908.54
SHORTGE-EAST FORK LANDS	.0	.0	.0	.0	.0	.0	.0	.0	.4	3.9	9.4	9.3	23.0	1726.56
SHORTAGE-BELOW JUNCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.3	23.07
PROJ DPLTN(CARSN VALLEY)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
OUTFLOW (CARSON VALLEY)	4.8	10.3	17.6	21.3	21.7	26.3	41.8	81.6	67.6	18.9	3.2	2.1	317.2	23786.60
SHORTAGE(C.V. - LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.1	.8	2.7	2.4	6.0	447.30
PROJ DPLTN(C.V.-LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
TOTAL INFLOW TO LAHTN	20.7	24.3	24.2	28.1	28.2	34.2	47.2	79.1	70.6	22.3	13.2	14.2	406.2	30464.21
RELEASE	28.3	12.4	.0	.0	.0	15.0	35.0	49.9	60.1	61.2	56.4	38.3	357.0	26821.08
EVAPORATION	.7	.3	.4	.5	.6	2.4	5.2	7.7	6.9	5.0	3.0	1.2	34.3	2575.20
SPILL	.0	.0	.0	.0	.0	.3	.9	3.8	8.4	.2	.0	.0	13.6	1024.69
CONTENT END OF MONTH	48.2	59.2	83.0	110.5	138.1	154.1	160.2	177.9	173.2	124.0	82.3	57.0	---	
TCID CREDIT IN STAMPEDE	98.7	103.1	104.0	109.8	110.6	110.1	114.9	109.8	109.5	110.2	106.2	101.2	1294.0	97053.03
CARSON RIVER CREDIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SHORTGE-CARSON DIVISION	1.7	.2	.0	.0	.0	.0	.0	.0	.0	1.8	3.2	1.5	8.4	626.90
PROJECT DPLTN [illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
ORIGINAL SHORTAGE-AREA I	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTAGE TO CARSN VALLEY	.2	.0	.0	.0	.0	.0	.0	.0	1.1	7.7	16.6	16.2	41.8	3137.66
TRUCKEE BELOW RENO	21.9	17.0	22.5	26.9	22.0	39.6	62.7	98.8	74.3	24.5	19.8	22.7	455.0	34125.39
M & I DEFICIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.21
TM AG DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.1	.5	34.00

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Run Number 5. Truckee River Disposal, 2000 Truckee Meadows Urbanization, 406 Criteria

[illegible] AVERAGES

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	MAY	JUN	JUL	AUG	SEP	TOTAL	75 YEAR GRAND TOTAL
LAKE TAHOE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.25	.26	.51	31.1	2335.65
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-38.4	-42.7	182.9	13716.10
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.1	5.6	10.5	82.7	6200.95
SPILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	91.1	6831.35
PROSSER [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	521.7	466.3	---	
RELEASE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.2	3.4	1.2	1.0	65.0	4877.50
EVAPORATION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0	6.6	7.6	2.2	35.9	2693.80
SPILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3	.4	.3	.1	1.6	122.60
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	27.1	2034.20
STAMPEDE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11.5	10.1	---	
RELEASE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5	1.6	129.1	9682.40
EVAPORATION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.0	[illegible]	8.3	10.0	59.8	4483.02
SPILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.6	[illegible]	1.8	1.2	10.5	784.60
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.5	1.1	.0	.0	55.9	4189.86
TOTAL [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	157.4	[illegible]	179.2	---	
RELEASE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8.3	10.0	117.8	8833.80
EVAPORATION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.7	[illegible]	13.2	15.8	70.8	5311.50
SPILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5	.4	.3	2.7	205.90
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.4	.0	.0	43.7	3275.90
OTHER [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23.7	17.6	---	
TRUCKEE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6.2	[illegible]	209.1	15681.50
FLOW AT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	50.0	35.8	30.6	550.4	41279.20
TRUCKEE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	31.2	27.4	31.6	560.6	42043.96
BY-PASS AT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30.7	26.9	31.2	558.0	41852.73
INFLOW TO [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70.3	15.1	5.1	8.2	382.7	28701.36
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.6	6.8	9.9	400.7	30052.44
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.6	21.8	22.9	175.3	13151.22
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TERMINAL [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.1	.1	.0	.2	16.64
WEST FORK [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.2	11.2	14.5	108.7	8149.29
EAST FORK [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.2	6.1	2.7	1.6	81.0	6077.50
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25.5	8.7	5.5	280.4	21028.50
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
SPILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25.5	8.7	5.5	280.4	21028.50
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	---	
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2	1.2	2.5	[illegible]	6.4	478.55
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5	2.6	4.6	4.4	12.1	908.54
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.4	3.4	9.4	9.3	23.0	1726.56
PROJ DELI[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.1	.2	.3	23.87
OUTFLOW [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
SHORTAGE[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.2	2.1	317.2	23788.60
PROJ DELIV[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.1	.8	2.7	2.4	6.0	447.30
TOTAL [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.1	21.3	13.2	15.2	405.6	30416.75
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	56.7	38.3	356.7	26751.31
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.0	2.4	1.2	34.3	2572.60
CONTENT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2	.0	.0	14.0	1049.59
TCID [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	126.2	81.8	57.5	---	
CARSON [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	107.9	104.5	97.0	1251.6	93866.67
SHORTAGE-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
PROJECT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2	2.1	3.4	1.6	9.3	698.69
ORIGINAL [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.0	.0	.0	.00
SHORTAGE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.2	1.2	2.5	2.3	6.4	478.55
TRUCKEE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.1	7.7	16.6	15.2	41.8	3137.66
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.4	19.5	23.0	432.3	32421.97
W R T DEFICIT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.1	.0	.2	15.63
TH AG DEFICIT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.0	.0	.1	.0	.1	14.14

Run Number 6. Truckee River Disposal, 1985 Truckee Meadows Urbanization, 288 Criteria

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1901-1975  STUDY PERIOD                              MONTHLY AND ANNUAL AVERAGES                                  75 YEAR GRAND TOTAL
                                 OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP   TOTAL
        TAHOE CITY PRECIP       1.62   3.38   5.42   6.28   5.22   4.33   2.09   1.19    .64    .26    .26    .51    31.1      2335.85
LAKE TAHOE-NET INFLOW          -31.0   -5.1   25.6   37.6   36.1   32.0   41.0   76.4   52.0   -3.5  -18.4  -42.9   182.9     13716.10
              RELEASE            6.8    6.6    7.4    4.0    6.0    5.0    4.2    4.2    4.5    6.2   10.7   11.6    86.0      6450.88
              EVAPORATION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
              SPILL               .0     .0     .1    3.1    2.8    6.8   10.8   28.9   29.3    6.0     .0     .0    87.8      6581.42
     CONTENT END OF MONTH      413.3  399.7  417.4  444.0  471.3  491.8  517.7  563.0  581.2  565.4  516.4  462.0    ---
PROSSER RESERVOIR INFLOW         1.5    2.2    3.6    3.4    3.5    5.7   11.7   17.4   10.2    3.4    1.2    1.0    65.0      4877.50
              RELEASE            1.3    1.8    2.2    2.3    2.1    2.7    2.2    1.0    2.1    8.8    7.7    2.7    36.6      2745.50
              EVAPORATION         .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1     1.6       121.90
              SPILL               .5     .3    1.4    1.1    1.3    2.3    4.1    8.8    5.3     .8     .0     .0    26.4      1983.20
     CONTENT END OF MONTH        8.5    8.5    8.5    8.5    8.6    9.1   14.4   22.2   24.7   18.1   11.3    9.6    ---
STAMPEDE RESERVOIR INFLO         3.9    3.9    7.5    6.5    6.9   11.2   25.3   35.6   20.2    5.0    1.5    1.6   129.1      9682.40
              RELEASE            2.7    3.9    4.8    4.7    4.3   10.7   18.0   10.6    5.3    5.3    3.1    2.1    75.4      5656.80
              EVAPORATION         .5     .4     .2     .2     .2     .4     .5    1.0    1.3    1.5    1.5    1.1     8.8       662.20
              SPILL              6.9     .1    1.6    1.2     .9    2.2    7.5   13.1    8.0    1.0     .0     .0    41.9      3143.50
     CONTENT END OF MONTH      142.6  142.2  144.2  144.6  145.5  143.4  142.8  153.5  159.2  156.4  153.3  151.7    ---
TOTAL INFLOW BOCA RESERVOIR      4.6    4.0    5.9    6.0    5.3   13.2   20.0   24.2   13.6    6.4    3.1    2.1   119.5      8961.20
              RELEASE            6.8    5.0    4.9    4.5    4.0    9.3   15.7    8.8    4.2    5.9    7.1    6.3    83.2      6240.44
              EVAPORATION         .1     .1     .1     .1     .1     .1     .2     .3     .4     .4     .4     .3     2.0       141.30
              SPILL              3.1     .0     .4     .9     .0    2.1    6.0   11.8    7.0    1.0     .0     .0    33.1      2488.96
     CONTENT END OF MONTH       15.8   13.6   14.2   14.6   15.5   17.1   21.2   24.6   25.7   25.7   21.3   16.8    ---
OTHER FLOW ABOVE FARAD           4.5    5.9    9.2    9.5    9.4   10.1   38.3   50.5   35.6   13.6    6.2    8.8   209.1     15681.50
TRUCKEE RIVER AT FARAD          24.6   22.0   24.4   29.3   29.3   46.2   80.6  113.2   88.4   41.1   30.7   28.6   552.3     41421.90
FLOW AT VISTA                   25.0   23.5   30.7   37.6   33.5   55.0   83.2  112.8   86.0   34.4   24.4   24.1   574.3     43071.41
TRUCKEE RIVER AT DERBY          25.6   23.5   30.7   37.6   33.5   55.0   83.1  112.3   85.6   34.4   23.9   23.8   571.7     42880.18
BY-PASS AT DERBY DAM            21.9   24.1   28.7   31.9   27.4   47.0   60.1   88.3   74.4   22.3   16.9   18.9   466.6     34997.43
INFLOW TO PYRAMID LAKE          22.4   24.5   29.9   34.2   27.0   48.3   63.6   91.5   78.0   23.4   17.7   14.4   479.7     35976.91
DIVERSION INTO TR.CANAL          3.1    2.2    1.9    3.7    4.1    7.4   22.4   24.0   11.2   12.1    7.0    4.9   105.2      7887.75
DIVERSION FROM TR.CANAL          2.2     .4     .0     .0     .0    1.1    2.5    3.6    4.4    4.4    4.2    2.9    26.2      1966.38
SHORTGE-TRUCKEE DIVISION          .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .0      .2        13.82
TERMINAL TR.CANAL FLOW            .3    1.5    1.7    3.4    3.7    5.3   17.5   17.3    5.0    4.8     .4     .1    61.1      4578.97
WEST FORK INFLOW                 1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   16.2    6.1    2.7    1.6    81.0      6077.50
EAST FORK INFLOW                 5.0    7.0    9.5   10.4   11.3   16.0   37.3   78.1   65.6   25.5    8.7    5.5   280.4     21028.50
              RELEASE             .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
              EVAPORATION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
              SPILL              5.0    7.0    9.5   10.4   11.3   16.0   37.3   78.1   65.6   25.5    8.7    5.5   280.4     21028.50
     CONTENT END OF MONTH         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0    ---
SHORTGE-WESTFORK-CALIF            .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3     6.4       478.55
SHORTGE-WESTFORK-NEVADA           .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4    12.1       908.54
SHORTGE-EAST FORK (CAL)           .0     .0     .0     .0     .0     .0     .0     .0     .4    3.4    9.4    9.3    23.0      1726.56
SHORTAGE-DELTA IRRIGATION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2      .3        23.87
PROJ DELIV (CARSON VALLEY)        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
OUTFLOW (CARSON VALLEY)          8.8   10.4   17.6   21.3   21.7   21.3   41.8   61.6   67.6   18.4    3.2    2.1   317.2     23788.60
SHORTAGE(C.V. - LAHONTAN)         .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4     6.0       447.30
PROJ DELIV(C.V.-LAHONTAN)         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
TOTAL INFLOW TO LAHONTAN         3.4   11.1   19.3   24.8   25.5   30.5   55.4   92.3   59.9   21.8    2.4     .8   357.5     26815.97
              RELEASE           20.6    2.1     .0     .0     .0   19.7   25.0   45.7   43.0   45.0   42.5   27.4   259.1     19429.79
              EVAPORATION        1.5     .7     .7     .3     .9    4.1    7.2   11.1   10.2    8.0    5.5    2.8    53.6      4021.90
              SPILL               .0     .0    1.2     .9    1.3    1.0    4.4   14.5   17.3     .2     .7     .0    42.2      3161.48
     CONTENT END OF MONTH      143.1  144.1  161.5  184.6  207.9  222.2  241.0  272.0  271.4  240.1  193.7  164.3    ---
TCID CREDIT RESTATEMENT           .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
CARSON RIVER CREDIT            -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -68.3  -68.3  -68.3  -811.0    -60823.60
SHORTGE-CARSON DIVISION          1.0     .1     .0     .0     .0     .0     .0     .0     .0     .0     .5    1.1     2.6       197.71
PROJECT DEFICIT ANNUAL            .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
ORIGINAL SHORTAGE-ANNUAL          .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3     6.4       478.55
SHORTAGE IN CARSON VALLY          .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   16.6   15.2    41.8      3137.66
TRUCKEE RIVER FLOW             16.4   13.2   21.8   26.7   22.9   43.0   74.7  101.8   73.6   25.7   16.3   15.4   457.8     34334.98
W.E.T. DEFICIT                    .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .0      .2        16.71
TM AG DEFICIT                     .2     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3     .2     1.0        77.12
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Run Number 7. Truckee River Disposal, 2000 Truckee Meadows Urbanization, 288 Criteria

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1901-1975  STUDY PERIOD                  [illegible] AVERAGES                          75 YEAR GRAND TOTAL
                                                                             TOTAL
    TAHOE [illegible]                    [illegible]                          31.1        2335.85
LAKE TAHOE-[illegible]                   [illegible]                         182.8       13713.10
         [illegible]                     [illegible]                          87.4        6551.25
         SPILL                           [illegible]                            .0            .00
   CONTENT [illegible]                   [illegible]                          86.4        6481.05
PROSSER [illegible]                      [illegible]                          ---
         RELEASE                         [illegible]                          65.0        4877.50
         EVAPORATION                     [illegible]                          36.7        2750.20
         SPILL                           [illegible]                           1.6         121.60
   CONTENT [illegible]                   [illegible]                          26.4        1976.60
STAMPEDE [illegible]                     [illegible]                          ---
         RELEASE                         [illegible]                         127.1        9532.40
         EVAPORATION                     [illegible]                          72.7        5454.61
         SPILL                           [illegible]                           8.7         653.40
   CONTENT [illegible]                   [illegible]                          39.1        2934.49
TOTAL INFLOW [illegible]                 [illegible]                          ---
         RELEASE                         [illegible]                         112.9        8470.00
         EVAPORATION                     [illegible]                          85.5        6419.44
         SPILL                           [illegible]                           2.3         159.50
   CONTENT [illegible]                   [illegible]                          31.0        2324.56
OTHER FLOW [illegible]                   [illegible]                          ---
TRUCKEE RIVER AT FARAD                   [illegible]                         209.1       15681.50
FLOW AT VISTA                            [illegible]                         552.4       41432.60
TRUCKEE RIVER [illegible]                [illegible]                         563.4       42254.94
BY-PASS [illegible]                      [illegible]                         560.8       42063.76
INFLOW TO [illegible]                    [illegible]                         456.3       34226.07
DIVERSION INTO [illegible]               [illegible]                         469.5       35210.54
DIVERSION FROM [illegible]               [illegible]                         104.5        7837.70
SHORTAGE-TRUCKEE [illegible]             [illegible]                          26.2        1964.44
TERMINAL [illegible]                     [illegible]                            .2          15.72
WEST FORK [illegible]                    [illegible]                          60.4        4531.91
EAST FORK [illegible]                    [illegible]                          81.0        6077.50
         RELEASE                         [illegible]                         280.4       21028.50
         EVAPORATION                     [illegible]                            .0            .00
         SPILL                           [illegible]                            .0            .00
   CONTENT [illegible]                   [illegible]                         280.4       21028.50
SHORTAGE-[illegible]                     [illegible]                          ---
SHORTAGE-[illegible]                     [illegible]                           6.4         478.55
SHORTAGE-[illegible]                     [illegible]                          12.1         906.54
SHORTAGE-[illegible]                     [illegible]                          23.0        1726.56
[illegible]                              [illegible]                            .3          23.87
[illegible]                              [illegible]                            .0            .00
SHORTAGE [illegible]                     [illegible]                         317.2       23786.60
[illegible]                              [illegible]                           6.0         447.30
TOTAL [illegible]                        [illegible]                            .0            .00
         RELEASE                         [illegible]                         356.9       26768.81
         EVAPORATION                     [illegible]                         258.8       19413.20
         SPILL                           [illegible]                          53.4        4008.80
   CONTENT [illegible]                   [illegible]                          41.9        3146.02
TOTAL [illegible]                        [illegible]                          ---
[illegible]                              [illegible]                            .0            .00
[illegible]                              [illegible]                        -811.0      -60823.60
[illegible]                              [illegible]                           2.9         214.30
[illegible]                              [illegible]                            .0            .00
[illegible]                              [illegible]                           6.4         478.55
SHORTAGE [illegible]                     [illegible]                          41.6        3117.66
TRUCKEE [illegible]                      [illegible]                         435.5       32666.21
[illegible] DEFICIT                      [illegible]                           1.3          97.18
[illegible] DEFICIT                      [illegible]                            .3          24.63
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Run Number 8a. Land Disposal, 1985 Truckee Meadows Urbanization, 406 Criteria

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1901-1975  STUDY PERIOD                       [illegible]  AVERAGES                          75 YEAR GRAND TOTAL

                              OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP  TOTAL
         TAHOE CITY PRECIP   1.62   3.48   5.42   5.76   5.22   4.31   2.00   1.19    .54    .26    .26    .51   31.1        2335.85
LAKE TAHOE-NET INFLOW       -31.6   -5.1   25.5   47.2   30.1 [illegible] 43.0 76.5   52.0   -3.5  -18.4  -42.9  182.9       13715.10
                RELEASE       7.8    5.2    7.7    8.0     .0    5.7    4.4    4.5    4.5    6.1    9.8   10.5   83.3        6245.31
                EVAPORATION    .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
                SPILL          .0     .0     .1    3.1    2.6    7.3   11.0   30.4   24.5    6.1     .6     .0   90.5        6786.99
      CONTENT END OF MONTH [illegible]                                                  [illegible] 526.0 465.2  ---
DONNER RESERVOIR INFLOW       1.5    2.3    3.5    3.5    4.5 [illegible] 11.7  17.5   10.2    3.4    1.2    1.0   65.0        4477.50
                RELEASE       1.4    1.2    2.4    2.4    2.1 [illegible] 2.2    1.0    2.0    2.5    7.6    2.4   35.1        2705.30
                EVAPORATION    .1     .1     .0     .0     .0     .1     .1     .2     .4     .4     .3     .1    1.6         122.60
                SPILL         1.1     .6    1.4    1.1    1.3     .3    4.1    5.4    5.3     .5     .0     .0   26.5        2018.70
      CONTENT END OF MONTH    8.4 [illegible] 9.5 [illegible] 8.7 [illegible] 14.4 22.2 24.7  17.2   11.5   10.0  ---
STAMPEDE RESERVOIR INFLOW     3.5    3.5    7.5    5.5    6.4   11.5   25.1   45.6   23.2    5.0    1.5    1.6  129.1        9682.40
                RELEASE       5.4    3.1    4.6    4.4    3.0    5.4    3.1    2.1    2.5    4.0    4.7   11.0   63.2        4742.91
                EVAPORATION    .2     .0     .2     .2     .2     .4     .6    1.2    1.5    1.4    1.8    1.2   10.4         776.10
                SPILL          .4     .3    1.2    1.2    1.0     .7   10.6   15.3    5.4    1.1     .0     .0   52.5        3941.49
      CONTENT END OF MONTH  157.5  157.3 [illegible] [illegible] 179.9 [illegible] 174.5 190.5 [illegible] 194.5 184.5 173.8  ---
TOTAL INFLOW BOCA RESERVOIR  16.7    9.3    8.3    5.7    5.0    5.5   14.2   14.6   12.1    5.2    9.7   11.1  117.9        8845.30
                RELEASE      12.5    5.3    4.5    4.2    3.0    3.5    1.3    1.6    1.5    4.7   14.8   10.5   73.4        5503.16
                EVAPORATION    .1     .1     .1     .1     .1     .1     .2     .4     .5     .5     .4     .3    2.7         204.30
                SPILL          .1     .2     .0    1.1     .0    2.3    7.7   14.2   21.4    1.4     .0     .0   41.3        3097.34
      CONTENT END OF MONTH   16.5    1.3   14.7   15.0   15.0   18.4   23.4   27.4   21.6   20.3   23.0   17.4  ---
OTHER FLOW ABOVE FARAD        4.6    5.3    4.2    5.6    4.4   12.1   45.4   50.5   25.6   11.5    6.2    8.8  209.1       15681.50
TRUCKEE RIVER AT FARAD       30.8   22.3   24.6   29.7   24.5   41.2   55.1  100.9   65.6   40.1   37.4   37.7  550.0       41242.30
FLOW AT VISTA                29.4   24.5   27.5   30.5   30.0   47.3   58.1  105.7   62.4   40.9   27.4   30.3  538.3       40370.37
TRUCKEE RIVER AT DERBY       29.3   24.1   27.5   30.5   30.0   47.3   57.9  105.1   62.4   30.4   27.2   29.9  535.7       40179.14
BY-PASS AT DERBY DAM          1.3 [illegible] 21.1 27.5  22.0 [illegible] 53.7  94.3   69.8   15.6    4.9    6.6  364.9       27363.80
INFLOW TO PYRAMID LAKE        2.2 [illegible] 21.7 29.3  22.3 [illegible] 56.2  46.0   71.9   17.1    6.5    8.2  392.4       28681.17
DIVERSION INTO T.C. CANAL    22.6   13.5    5.5    7.2    7.2   13.5   14.3   10.4   12.7   14.7   22.4   23.3  170.9       12815.03
DIVERSION FROM T.C. CANAL     3.4    1.3     .0     .0     .0    1.7    3.5    5.5    6.6    6.6    6.3    4.3   39.4        2957.79
SHORTAGE-TRUCKEE DIVISION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .2     .2     .1     .5          42.29
TERMINAL TRUCKEE CANAL FLOW  16.2   15.3    5.2    6.3    5.5    3.7    5.4    3.5    4.4    4.5   11.9   14.2  105.0        7875.84
WEST FORK INFLOW              1.8    2.5    4.0    2.7    2.9    4.2   12.4   24.5   16.2    6.1    2.7    1.6   81.0        6077.50
EAST FORK INFLOW              5.0    7.3    9.5   10.4   11.3   15.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4       21028.50
                RELEASE        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
                EVAPORATION    .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
                SPILL         5.0    7.3    9.5   10.4   11.3   15.6   37.4   78.1   65.6   25.5    8.7    5.5  280.4       21028.50
      CONTENT END OF MONTH     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0  ---
SHORTAGE-WESTFORK-CALIF        .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4         478.55
SHORTAGE-WESTFORK-NEVADA       .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4   12.1         908.54
SHORTAGE-EAST FORK [illegible] .0    .0     .0     .0     .0     .0     .0     .4    3.9    4.4    4.3   23.0        1726.56
SHORTAGE-[illegible]           .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3          23.87
REQD [illegible] (CARSON VALLEY) .0   .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
OUTFLOW (CARSON VALLEY)       4.8   13.5   17.6   21.3   21.7   22.3   61.3   81.6   67.6   18.9    4.2    2.1  317.2       23786.60
SHORTAGE (C.V. - LAHONTAN)     .0     .0     .0     .0     .0     .0     .0     .0     .1     .4    2.7    2.4    6.0         447.30
REQD [illegible] (C.V.-LAHONTAN) .0   .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
TOTAL INFLOW TO LAHONTAN     19.3 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] 21.6 13.9 15.6 401.9 30144.03
                RELEASE      27.8 [illegible]  .0     .0     .0   13.0   35.0   49.9   50.3   60.5   56.2   37.8  354.0       26548.61
                EVAPORATION [illegible]                                  5.1    7.6    6.7    4.4    2.9    1.2   33.7        2520.90
                SPILL          .0     .0     .0     .1     .3     .3 [illegible] 4.0    1.4     .2     .0     .0   13.7        1025.29
      CONTENT END OF MONTH   47.5   57.8 [illegible] 108.1 [illegible] [illegible] [illegible] 174.0 [illegible] 125.9 90.7 57.3  ---
TOTAL CREDIT IN [illegible]  57.2 [illegible] [illegible] 106.0 101.5 [illegible] 107.1 104.0 104.7 104.0 100.0 91.3 1193.1 89484.96
CARSON RIVER [illegible]       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
SHORTAGE-CARSON DIVISION      2.4     .4     .0     .0     .0     .0     .0     .0     .0    2.0    4.9    2.1   12.0         901.37
PROJECT [illegible]            .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
ORIGINAL SHORTAGE-[illegible]  .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4         478.55
SHORTAGE TO CARSON VALLEY      .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   15.6   16.2   41.0        3137.66
TRUCKEE [illegible]        [illegible] 14.1 21.0 [illegible] [illegible] [illegible] 62.2 97.5 [illegible] 24.6 22.5 24.4 455.5 34161.91
[illegible] DEFICIT            .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .21
[illegible] DEFICIT            .2     .0     .0     .0     .0     .0     .0     .0     .0     .2     .2     .1     .7          50.12
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Run 8. Land Disposal, 2000 Truckee Meadows Urbanization, 406 Criteria

1901-1976 STUDY PERIOD	MONTHLY AND ANNUAL AVERAGES													75 YEAR GRAND TOTAL
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	
TAHOE CITY PRECIP	1.62	3.38	5.42	6.26	5.22	4.30	2.09	1.15	.64	.25	.26	.51	31.1	2335.85
LAKE TAHOE-NET INFLOW	-31.6	-5.1	25.6	37.6	45.1	32.8	43.0	74.4	52.0	-3.5	-38.4	-42.9	182.9	13716.10
RELEASE	8.4	5.4	7.8	8.0	6.0	5.8	4.2	4.2	4.5	6.2	10.0	11.1	84.4	6331.18
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	.0	.0	.1	3.1	2.5	7.2	11.0	29.9	29.5	6.6	.0	.0	89.3	6701.12
CONTENT END OF MONTH	416.2	406.7	420.5	447.0	474.5	494.7	522.4	564.7	582.7	567.0	518.6	464.7	---	
PROSSER RESERVOIR INFLOW	1.5	.2	4.0	3.4	3.5	5.5	11.7	17.8	10.2	3.4	1.2	1.0	65.0	4877.50
RELEASE	1.3	1.5	2.3	2.3	2.1	2.7	2.2	1.6	2.1	8.7	7.7	2.4	36.4	2728.29
EVAPORATION	.1	.1	.0	.0	.0	.1	.1	.2	.3	.4	.3	.1	1.6	122.60
SPILL	1.1	.4	1.4	1.1	1.3	2.3	4.1	8.8	5.3	.2	.0	.0	26.6	1994.80
CONTENT END OF MONTH	8.5	8.6	8.5	8.5	8.6	9.1	14.4	22.2	24.7	18.2	11.4	9.9	---	
STAMPEDE RESERVOIR INFLOW	3.5	3.5	7.4	6.5	5.4	11.2	25.3	35.5	20.2	5.0	1.5	1.6	129.1	9682.40
RELEASE	3.7	3.7	4.6	4.4	3.8	5.3	4.0	2.3	3.0	6.0	11.8	11.3	67.5	5096.01
EVAPORATION	.6	.1	.2	.2	.2	.4	.6	1.2	1.5	1.8	1.7	1.2	10.1	753.80
SPILL	7.5	.2	.9	1.1	.9	2.1	9.7	15.3	9.5	1.1	.0	.0	48.2	3612.69
CONTENT END OF MONTH	149.0	146.7	150.8	151.6	153.2	156.6	168.6	185.4	191.6	187.7	175.7	164.8	---	
TOTAL INFLOW BOCA RESERVOIR	15.2	3.1	5.7	5.6	4.7	7.6	13.3	18.0	12.8	7.2	11.8	11.3	118.3	8869.60
RELEASE	12.1	5.1	4.2	4.2	3.0	4.6	1.3	.5	1.8	6.6	16.4	16.4	76.9	5766.32
EVAPORATION	.1	.1	.1	.1	.1	.1	.2	.3	.4	.5	.4	.3	2.7	200.60
SPILL	4.0	.3	.6	1.1	.8	1.9	6.5	13.6	8.3	1.2	.0	.0	38.1	2860.18
CONTENT END OF MONTH	16.7	14.2	14.4	14.6	15.4	17.4	22.7	26.3	28.6	27.5	22.5	17.1	---	
OTHER FLOW ABOVE FARAD	4.8	5.8	8.2	9.6	9.4	12.1	38.3	50.6	35.6	13.5	6.2	8.8	209.1	15681.50
TRUCKEE RIVER AT FARAD	35.7	22.1	23.4	28.7	24.4	40.8	66.8	107.7	86.1	41.9	39.3	37.9	550.9	41320.30
FLOW AT VISTA	25.4	21.6	25.3	31.9	27.2	43.8	63.9	103.4	79.1	27.9	25.9	27.9	503.6	37770.42
TRUCKEE RIVER AT DERBY	26.4	21.6	25.3	31.9	27.2	42.8	63.7	102.4	74.7	27.4	25.4	27.6	501.1	37574.18
BY-PASS AT DERBY DAM	5.7	7.0	19.6	25.5	19.7	32.4	50.2	91.1	65.8	12.7	3.5	4.5	337.5	25304.34
INFLOW TO PYRAMID LAKE	7.6	8.3	20.0	26.1	20.5	33.4	52.6	92.9	67.9	14.1	5.1	6.2	354.0	26598.66
DIVERSION INTO TR. CANAL	20.6	14.6	5.9	6.4	7.5	11.3	13.6	11.3	12.9	14.7	21.9	23.0	163.6	12264.46
DIVERSION FROM TR. CANAL	3.3	1.4	.0	.0	.0	1.7	3.8	5.5	6.7	6.6	6.2	4.2	39.3	2946.52
SHORTGE-TRUCKEE DIVISION	.1	.0	.0	.0	.0	.0	.0	.0	.0	.2	.3	.2	.7	51.55
TERMINAL TR. CANAL FLOW	15.0	11.2	5.3	5.8	6.7	8.1	7.7	3.9	4.1	4.5	11.5	14.7	98.5	7389.64
WEST FORK INFLOW	1.8	2.3	3.0	2.7	2.9	4.2	12.9	24.5	15.2	6.1	2.7	1.6	81.0	6077.50
EAST FORK INFLOW	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
RELEASE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	5.0	7.0	9.5	10.4	11.3	16.5	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
CONTENT END OF MONTH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	
SHORTGE-WESTSIDE-CALIF	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTGE-WESTSIDE-NEVADA	.1	.0	.0	.0	.0	.0	.0	.0	.5	2.6	4.6	4.4	12.1	908.54
SHORTGE-EAST FK-[illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.4	3.0	9.4	9.3	23.0	1726.56
SHORTAGE-NEW [illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.3	23.87
GROUND DEPLTN(CARSON VALLEY)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
OUTFLOW (CARSON VALLEY)	4.8	10.3	17.6	21.3	21.7	20.3	41.8	81.6	67.6	18.9	3.2	2.1	317.2	23786.60
SHORTAGE(C.V. - LAHNTN)	.0	.0	.0	.0	.0	.0	.0	.0	.1	.4	2.7	2.4	6.0	447.30
GROUND DEPLTN(C.V.-LAHNTN)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
TOTAL INFLOW TO LAHONTAN	14.0	20.5	22.9	27.2	28.5	33.8	45.6	73.6	69.0	21.7	13.6	15.4	395.5	29664.93
RELEASE	26.2	1.1	.0	.0	.0	15.6	35.0	48.4	58.5	60.4	55.0	38.6	349.4	26207.12
EVAPORATION	.6	.4	.6	.5	.6	2.8	5.0	7.4	6.6	4.8	2.8	1.2	32.7	2455.00
SPILL	.0	.3	.0	.0	.1	.3	.9	3.5	7.7	.2	.0	.0	12.7	948.96
CONTENT END OF MONTH	66.5	85.2	77.1	103.2	131.7	147.4	152.2	170.3	166.4	122.7	78.5	56.2	---	
TCID CREDIT IN STAMPEDE	76.5	80.3	88.4	91.6	93.1	94.9	99.9	99.9	99.9	96.8	89.3	80.8	1090.3	41775.10
CARSON RIVER CREDIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SHORTGE-CARSON DIVISION	3.9	.2	.0	.0	.0	.0	.0	.0	1.5	2.6	5.2	3.3	16.6	1242.28
PROJECT [illegible]	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
ORIGINAL SHORTAGE-AREA I	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTAGE IN CARSON VALLEY	.2	.0	.0	.0	.0	.0	.0	.0	1.1	7.7	15.6	16.2	41.8	3137.66
TRUCKEE FLOW RENO	21.9	13.3	15.2	23.7	17.3	35.2	50.4	96.3	71.4	23.8	23.1	24.3	432.9	32467.33
M.& I. DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.2	18.63
TM AG DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.2	16.60

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Run 9a. Land Disposal, 2000 Truckee Meadows Urbanization, 406 Criteria

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1901-1975  STUDY PERIOD                              MONTHLY AND ANNUAL AVERAGES                           75 YEAR GRAND TOTAL

                            OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP   TOTAL
       TAHOE CITY PRECIP    1.62   3.39   5.42   6.28   5.22   4.30   2.09   1.19    .64    .25    .26    .51   31.1      2335.65
 LAKE TAHOE-NET INFLOW     -31.0   -5.1   25.6   37.6   36.1   32.8   43.0   76.4   52.0   -3.5  -38.4  -42.9  182.9     13716.10
              RELEASE        9.7    9.0    8.0    8.0    6.0    5.6    4.2    4.2    4.6    6.3   10.8   11.6   88.2      6612.48
              EVAPORATION     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
              SPILL           .0     .0     .1    2.4    2.3    6.5   10.7   28.1   28.9    6.0     .0     .0   85.6      6419.82
    CONTENT END OF MONTH   409.2  395.1  412.7  439.4  467.2  487.9  516.0  560.1  578.6  562.7  513.5  459.0   ---
 PROSSER RESERVOIR INFLOW    1.5    2.2    3.6    3.4    3.5    5.5   11.7   17.8   10.2    3.4    1.2    1.0   65.0      4877.50
              RELEASE        1.3    1.2    2.2    2.3    2.1    2.7    2.2    1.0    2.1    8.7    7.9    2.5   36.7      2753.14
              EVAPORATION     .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1    1.6       121.60
              SPILL           .2     .4    1.4    1.1    1.3    2.3    4.1    8.8    5.3     .8     .0     .0   26.3      1975.86
    CONTENT END OF MONTH     8.4    8.4    9.4    8.4    9.5    9.0   14.3   22.1   24.6   18.1   11.2    9.5   ---
 STAMPEDE RESERVOIR INFLO    3.9    3.9    7.9    6.5    5.4   11.2   25.3   35.6   20.2    5.0    1.5    1.6  129.1      9682.40
              RELEASE        3.0    3.9    5.4    4.7    4.5   11.1   18.4   11.2    5.5    7.0    5.4    2.2   82.2      6162.01
              EVAPORATION     .5     .4     .2     .2     .2     .4     .5    1.0    1.3    1.5    1.4    1.0    8.5       634.90
              SPILL          4.5     .0     .6    1.0     .7    2.2    6.6   11.6    7.4     .9     .0     .0   35.4      2660.59
    CONTENT END OF MONTH   136.0  135.6  137.4  138.0  139.0  135.6  136.4  148.2  154.3  150.0  144.6  143.0   ---
 TOTAL INFLO BOCA RESERVOR   7.5    4.0    6.1    5.8    5.3   13.5   25.6   23.3   13.2    8.0    5.5    2.2  119.8      8983.50
              RELEASE        6.3    5.6    5.1    4.3    3.8    9.9   16.1    9.4    4.2    7.5    9.1    6.3   87.7      6573.83
              EVAPORATION     .1     .1     .1     .1     .1     .1     .2     .3     .4     .4     .4     .3    2.5       186.90
              SPILL          2.0     .0     .2     .6     .6    2.0    5.5   10.2    6.7    1.0     .0     .0   29.1      2182.27
    CONTENT END OF MONTH    14.7   13.0   13.8   14.6   15.4   16.9   20.5   23.9   25.7   24.7   20.6   16.2   ---
 OTHER FLOW ABOVE FARAD      4.8    5.9    8.2    9.5    9.4   18.1   38.3   50.5   35.6   13.6    6.2    8.8  209.1     15681.50
 TRUCKEE RIVER AT FARAD     24.1   22.0   24.4   28.2   29.8   40.4   80.5  111.4   86.5   42.7   33.1   28.4  552.7     41448.95
 FLOW AT VISTA              21.7   24.1   28.0   34.3   30.3   52.4   80.5  108.1   82.8   33.6   23.8   21.1  540.8     40560.99
 TRUCKEE RIVER AT DERBY     21.7   24.1   28.0   34.3   30.3   52.4   80.3  107.6   82.4   33.1   23.3   20.7  538.3     40369.76
 BY-PASS AT DERBY DAM       18.7   21.0   25.8   30.6   26.5   45.6   58.5   84.3   71.7   21.3   16.3   15.8  436.0     32700.74
 INFLOW TO PYRAMID LAKE     19.1   21.4   26.0   31.0   26.8   40.3   61.9   87.4   73.3   22.3   17.1   16.3  448.9     33669.33
 DIVERSION INTO TR.CANAL     3.0    3.1    2.2    3.7    3.9    6.8   21.9   23.3   10.6   11.8    7.0    4.9  102.3      7669.02
 DIVERSION FROM TR.CANAL     2.2     .0     .0     .0     .0    1.1    2.5    3.6    4.3    4.3    4.1    2.8   25.4      1943.21
 SHORTGE-TRUCKEE DIVISION     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .2     .1     .5        36.99
 TERMINAL TR.CANAL  FLOW      .3    1.7    1.4    3.4    3.5    4.6   16.5   16.7    4.5    4.6     .5     .2   58.7      4401.01
 WEST FORK INFLOW            1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   16.2    6.1    2.7    1.6   81.0      6077.50
 EAST FORK INFLOW            5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4     21028.50
              RELEASE         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
              EVAPORATION     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
              SPILL          5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4     21028.50
    CONTENT END OF MONTH      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0   ---
 SHORTGE-WESTFORK-CALIF       .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4       478.55
 SHORTGE-WESTFORK-NEVADA      .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4   12.1       906.54
 SHORTGE-EAST FORK LANDS      .0     .0     .0     .0     .0     .0     .0     .0     .4    3.9    9.4    9.3   23.0      1726.56
 SHORTAGE--BELOW JUNCTION     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3        23.87
 PROJ DPLTN(CARSON VALLEY)    .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
 OUTFLOW (CARSON VALLEY)     4.8   10.3   17.6   21.3   21.7   26.3   41.8   81.6   67.6   18.9    3.2    2.1  317.2     23786.60
 SHORTAGE(C.V. - LAHON)       .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4    6.0       447.30
 PROJ DPLTN(C.V.-LAHON)       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
 TOTAL INFLOW TO LAHON       8.3   11.3   19.5   24.8   25.3   30.4   54.4   91.7   64.4   21.7    2.5     .9  355.2     26637.91
              RELEASE       20.3    9.2     .0     .0     .0   10.7   25.0   35.7   43.0   45.0   41.7   27.4  258.0     19352.19
              EVAPORATION    1.5     .7     .7     .8     .9    4.0    7.1   11.0   10.0    7.9    5.4    2.8   52.9      3964.90
              SPILL           .0     .0    1.1     .9    1.3    1.7    4.4   14.4   17.0     .2     .7     .0   41.6      3117.95
    CONTENT END OF MONTH   140.6  141.4  159.1  182.2  205.3  219.2  237.1  267.7  267.1  235.7  190.4  161.2   ---
 TCID CREDIT IN STAMPEDE      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
 CARSON RIVER CREDIT       -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -68.3  -68.3  -68.3 -811.0    -60823.60
 SHORTGE-CARSON DIVISION     1.1     .2     .0     .0     .0     .0     .0     .0     .0     .0    1.3    1.1    3.6       275.31
 PROJECT DPLTN(CAR.AREA)      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0          .00
 ORIGINAL SHORTAGE-WFCAL      .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4       478.55
 SHORTAGE IN CARSON VALLEY    .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   16.6   16.2   41.8      3137.66
 TRUCKEE INFLOW RENO        15.9   18.8   21.9   26.1   22.4   44.0   74.6   99.9   73.2   27.4   18.6   15.3  458.2     34363.36
 M.& I DEFICIT                .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .0     .2        17.11
 TM AG DEFICIT                .3     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3     .2    1.0        78.06
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Run Number 9. Land Disposal, 2000 Truckee Meadows Urbanization, 288 Criteria

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1901-1975  STUDY PERIOD                              MONTHLY AND ANNUAL AVERAGES                            75 YEAR GRAND TOTAL

                               OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP  TOTAL
      TAHOE CITY PRECIP       1.62   3.38   5.42   6.28   5.22   4.39   2.09   1.19    .64    .25    .26    .51   31.1        2335.85
LAKE TAHOE-NET INFLOW        -31.0   -5.1   25.6   37.6   36.1   32.8   43.0   76.4   52.0   -3.5  -38.4  -42.9  182.9       13716.10
               RELEASE        10.7    9.3    8.0    7.9    6.0    5.0    4.2    4.2    4.7    6.4   11.1   11.9   90.1        6760.79
               EVAPORATION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
               SPILL            .0     .0     .1    2.8    2.1    6.2   10.5   27.3   28.6    6.0     .0     .0   83.5        6271.51
    CONTENT END OF MONTH     404.8  390.5  408.0  434.9  462.9  483.9  512.1  557.0  575.8  559.9  510.4  455.6   ---
PROSSER RESERVOR INFLOW        1.5    2.2    3.6    3.4    3.5    5.5   11.7   17.8   10.2    3.4    1.2    1.0   65.0        4877.50
               RELEASE         1.4    1.8    2.2    2.3    2.1    2.8    2.3    1.1    2.1    8.7    7.9    2.4   37.0        2778.35
               EVAPORATION      .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1    1.6         120.90
               SPILL            .8     .4    1.4    1.1    1.3    2.2    4.0    8.8    5.2     .8     .0     .0   26.0        1951.35
    CONTENT END OF MONTH       8.4    8.4    8.4    8.4    8.5    9.0   14.3   22.0   24.6   18.1   11.1    9.5   ---
STAMPEDE RESERVOR INFLO        3.9    3.0    7.9    6.5    6.4   11.2   25.3   35.6   20.2    5.0    1.5    1.6  129.1        9682.40
               RELEASE         3.2    4.0    5.2    4.7    4.3   12.6   18.5   11.5    5.8    9.6    8.6    2.1   90.1        6756.45
               EVAPORATION      .5     .3     .2     .2     .2     .4     .5    1.0    1.2    1.4    1.3     .9    8.0         603.00
               SPILL           2.3     .0     .4     .8     .6    1.4    5.5    9.3    6.8     .6     .0     .0   28.0        2103.02
    CONTENT END OF MONTH     124.7  124.3  126.5  127.3  128.6  125.5  126.3  140.2  146.5  139.7  131.3  129.8   ---
TOTALINFLO BOCA RESRVOR        5.6    4.0    5.7    5.6    5.0   14.2   24.6   21.2   12.9   10.6    8.6    2.1  120.3        9020.40
               RELEASE         5.4    5.3    4.9    4.4    3.6   11.4   16.8    9.8    4.6    9.9   12.0    5.9   94.0        7051.49
               EVAPORATION      .1     .1     .1     .1     .1     .1     .2     .3     .3     .4     .4     .2    2.4         178.60
               SPILL           1.5     .0     .2     .4     .5    1.3    4.7    8.1    5.6    1.0     .0     .0   23.3        1749.81
    CONTENT END OF MONTH      13.8   12.3   12.9   13.7   14.4   15.6   18.8   21.9   24.3   23.5   19.7   15.7   ---
OTHER FLOW ABOVE FARAD         4.8    5.9    8.2    9.6    9.4   15.1   35.3   50.5   35.6   13.6    6.2    8.8  209.1       15681.50
TRUCKEE RIVER AT FARAD        23.7   22.0   24.3   27.9   24.4   45.9   80.0  108.9   85.4   45.2   36.3   28.3  553.3       41494.80
FLOW AT VISTA                 19.6   21.5   25.2   31.1   27.1   49.8   77.1  104.1   74.4   31.6   23.3   18.3  507.2       38042.16
TRUCKEE RIVER AT DERBY        19.6   21.5   25.2   31.1   27.1   49.8   77.0  103.6   78.0   31.0   22.8   18.0  504.7       37650.93
BY-PASS AT DERBY DAM          16.4   18.1   23.3   27.4   23.6   43.4   56.4   80.6   68.2   19.7   15.8   13.2  406.1       30459.32
INFLOW TO PYRAMID LAKE        16.8   18.6   23.5   27.8   24.0   44.1   59.7   83.7   69.7   20.8   16.6   13.6  418.8       31412.96
DIVERSION INTO TR.CANAL        3.2    3.4    1.9    3.7    3.5    6.4   20.6   23.0    9.8   11.3    7.0    4.8   98.5        7391.58
DIVERSION FROM TR.CANAL        2.2     .9     .0     .0     .0    1.1    2.5    3.5    4.3    4.3    4.1    2.8   25.8        1932.32
SHORTGE-TRUKEE DIVISION         .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .2     .1     .6          47.80
TERMINAL TR.CANAL  FLOW         .5    2.0    1.7    3.3    3.2    4.4   15.3   16.4    3.8    4.1     .5     .2   55.4        4153.32
WEST FORK INFLOW               1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   16.2    6.1    2.7    1.6   81.0        6077.50
EAST FORK INFLOW               5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4       21028.50
               RELEASE          .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
               EVAPORATION      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
               SPILL           5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4       21028.50
    CONTENT END OF MONTH        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0   ---
SHORTGE-WESTFORK-CALIF          .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4         478.55
SHORTGE-WESTFORK-NEVADA         .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4   12.1         908.54
SHORTGE-EAST FORK LANDS         .0     .0     .0     .0     .0     .0     .0     .0     .4    3.9    9.4    9.3   23.0        1726.56
SHORTAGE-BELOW JUNCTION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3          23.87
PROJ DPLTN(CARSN VALLY)         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
OUTFLOW (CARSON VALLEY)        4.8   10.3   17.6   21.3   21.7   26.3   41.8   81.6   67.6   18.9    3.2    2.1  317.2       23786.60
SHORTAGE(C.V. - LAHTN)          .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4    6.0         447.30
PROJ DPLTN(C.V.-LAHTN)          .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
TOTAL INFLOW TO LAHTN          3.5   11.6   19.3   24.7   24.9   30.0   53.2   91.4   68.7   21.2    2.5     .9  351.9       26340.22
               RELEASE        20.2    9.1     .0     .0     .0   10.7   25.0   35.7   43.0   44.0   41.3   27.4  256.3       19225.41
               EVAPORATION     1.4     .7     .7     .8     .9    3.9    7.0   10.8    9.9    7.7    5.3    2.7   51.9        3891.60
               SPILL            .0     .0    1.0     .9    1.2    1.7    4.3   14.3   16.7     .2     .7     .0   40.9        3070.41
    CONTENT END OF MONTH     136.2  138.0  155.6  178.7  201.5  215.1  232.0  262.6  261.7  231.0  186.2  157.0   ---
TCID CREDIT IN STAMPEDE         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
CARSON RIVER CREDIT          -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -67.3  -68.3  -68.3  -68.3 -811.0      -60823.60
SHORTGE-CARSON DIVISION        1.2     .3     .0     .0     .0     .0     .0     .0     .0    1.0    1.7    1.1    5.4         402.09
PROJECT DPLTN ON AREAL          .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0            .00
ORIGINAL SHORTAGE-AREAL         .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4         478.55
SHORTAGE IN CARSN VALLY         .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   16.5   16.2   41.8        3137.66
TRUCKEE BELOW RENO            15.1   16.2   19.1   22.9   19.2   41.4   71.5   97.5   70.8   27.4   20.5   14.7  436.6       32742.96
M & I DEFICIT                   .3     .1     .0     .0     .0     .0     .0     .0     .1     .3     .5     .1    1.4         109.42
TM AG DEFICIT                   .1     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .1     .3          26.94
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Run Number 10a. Truckee Canal Disposal, 1985 Truckee Meadows Urbanization, 406 Criteria

MONTHLY AND ANNUAL AVERAGES

1901-1975 STUDY PERIOD	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	75 YEAR GRAND TOTAL
TAHOE CITY PRECIP	1.62	3.38	5.42	6.28	5.22	4.30	2.09	1.19	.64	.25	.26	.51	31.1	2335.85
LAKE TAHOE-NET INFLOW	-31.0	-5.1	25.6	37.6	36.1	32.8	43.0	76.4	52.0	-3.5	-38.4	-42.9	182.9	13716.10
RELEASE	7.6	8.4	7.7	8.0	6.0	5.7	4.3	4.3	4.5	6.1	9.7	10.5	82.7	6200.86
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	.0	.0	.1	3.1	2.7	7.3	11.0	31.0	29.7	6.2	.0	.0	91.0	6831.44
CONTENT END OF MONTH	420.5	407.1	425.0	451.5	478.9	498.7	526.5	567.6	585.4	569.7	521.5	468.2	---	
PROSSER RESERVOR INFLOW	1.5	2.2	3.6	3.4	3.5	5.5	11.7	17.8	10.2	3.4	1.2	1.0	65.0	4877.50
RELEASE	1.5	1.8	2.2	2.3	2.1	2.5	2.2	1.0	2.0	8.6	7.6	2.2	36.0	2697.70
EVAPORATION	.1	.1	.0	.0	.0	.1	.1	.2	.3	.4	.3	.1	1.6	122.60
SPILL	1.1	.4	1.4	1.1	1.3	2.5	4.1	8.8	5.3	.9	.0	.0	27.1	2030.30
CONTENT END OF MONTH	8.6	8.6	8.5	8.5	8.7	9.1	14.4	22.2	24.7	18.2	11.5	10.1	---	
STAMPEDE RESERVOR INFLO	3.9	3.9	7.9	6.5	6.4	11.2	25.3	35.6	20.2	5.0	1.5	1.6	129.1	9682.40
RELEASE	8.0	3.7	4.6	4.4	3.9	5.1	3.0	2.1	2.9	4.2	8.0	9.8	59.9	4489.14
EVAPORATION	.6	.4	.2	.2	.2	.4	.6	1.3	1.6	1.8	1.8	1.2	10.5	786.40
SPILL	8.8	.3	1.8	1.3	1.0	3.0	11.0	17.1	10.4	1.1	.0	.0	55.8	4186.96
CONTENT END OF MONTH	162.4	161.9	163.2	163.8	165.0	167.6	178.3	193.5	198.8	196.6	188.3	178.9	---	
TOTALINFLO BOCA RESRVOR	16.8	4.1	6.6	5.8	5.1	8.4	14.6	19.7	13.6	5.4	8.0	9.8	117.8	8837.00
RELEASE	12.4	6.3	4.9	4.2	3.0	3.4	1.4	.3	1.6	4.9	12.8	15.8	71.0	5323.49
EVAPORATION	.1	.1	.1	.1	.1	.1	.2	.3	.4	.5	.4	.3	2.8	206.30
SPILL	4.1	.2	1.1	1.3	1.0	2.5	8.0	14.7	9.2	1.4	.0	.0	43.5	3266.71
CONTENT END OF MONTH	17.2	14.7	15.2	15.3	16.3	18.6	23.7	27.9	30.3	29.0	23.8	17.5	---	
OTHER FLOW ABOVE FARAD	4.8	5.9	8.2	9.6	9.4	18.1	38.3	50.5	35.6	13.6	6.2	8.8	209.1	15681.50
TRUCKEE RIVER AT FARAD	30.6	22.2	25.0	29.0	24.7	41.4	68.4	109.8	87.0	40.3	35.5	36.5	550.4	41282.00
FLOW AT VISTA	28.1	24.3	28.5	35.1	30.3	47.4	68.3	106.6	83.3	31.1	26.1	29.1	538.1	40358.22
TRUCKEE RIVER AT DERBY	28.1	24.3	28.5	35.1	30.3	47.4	68.2	106.0	82.8	30.5	25.6	28.7	535.6	40166.99
BY-PASS AT DERBY DAM	7.4	9.1	23.6	29.6	25.2	40.0	57.9	98.4	71.8	17.9	6.0	10.1	397.0	29774.91
INFLOW TO PYRAMID LAKE	9.1	10.3	24.1	30.1	25.6	40.6	59.6	99.4	73.4	19.1	7.5	11.2	410.1	30758.56
DIVERSION INTO TR.CANAL	20.7	15.2	4.9	5.5	5.1	7.4	10.3	7.6	11.0	12.6	19.6	18.6	138.6	10391.26
DIVERSION FROM TR.CANAL	.5	.0	.0	.0	.0	.0	1.1	2.5	3.8	3.7	3.4	1.5	16.5	1238.26
SHORTGE-TRUKEE DIVISION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.0	.1	13.27
TERMINAL TR.CANAL FLOW	17.8	13.3	4.4	5.0	4.6	6.5	7.7	3.7	5.4	5.7	12.4	13.9	100.4	7528.20
WEST FORK INFLOW	1.6	2.3	3.0	2.7	2.9	4.2	12.9	24.8	16.2	6.1	2.7	1.6	81.0	6077.50
EAST FORK INFLOW	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
RELEASE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
CONTENT END OF MONTH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	
SHORTGE-WESTFORK-CALIF	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTGE-WESTFORK-NEVADA	.1	.0	.0	.0	.0	.0	.0	.0	.5	2.6	4.6	4.4	12.1	908.54
SHORTGE-EAST FORK LANDS	.0	.0	.0	.0	.0	.0	.0	.0	.4	3.9	9.4	9.3	23.0	1726.56
SHORTAGE-BELOW JUNCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.3	23.87
PROJ DPLTN(CARSN VALLY)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
OUTFLOW (CARSON VALLEY)	4.8	10.3	17.6	21.3	21.7	26.3	41.8	81.6	67.6	18.9	3.2	2.1	317.2	23786.60
SHORTAGE(C.V. - LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.1	.8	2.7	2.4	6.0	447.30
PROJ DPLTN(C.V.-LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
TOTAL INFLOW TO LAHTN	20.9	24.3	24.8	29.2	29.2	33.2	45.6	78.8	70.3	22.9	14.4	14.6	408.2	30612.71
RELEASE	28.5	12.9	.0	.0	.0	15.0	35.0	49.9	60.1	61.2	56.9	38.3	357.9	26842.24
EVAPORATION	.6	.3	.4	.5	.6	3.0	5.2	7.7	6.8	5.0	2.9	1.2	34.4	2582.00
SPILL	.0	.0	.0	.0	.1	.5	1.1	4.3	9.0	.2	.0	.0	15.2	1141.32
CONTENT END OF MONTH	49.1	60.2	84.5	113.2	141.6	156.5	160.8	177.6	171.9	128.4	82.9	57.9	---	
TCID CREDIT IN STAMPEDE	99.1	103.9	108.6	110.5	110.9	110.5	116.7	111.8	112.0	112.2	109.2	101.7	1307.0	98027.20
CARSON RIVER CREDIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SHORTGE-CARSON DIVISION	1.4	.2	.0	.0	.0	.0	.0	.0	.0	1.8	3.2	1.5	8.1	607.76
PROJECT DPLTN ON AREA1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
ORIGINAL SHORTAGE-AREA1	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTAGE IN CARSN VALLY	.2	.0	.0	.0	.0	.0	.0	.0	1.1	7.7	16.6	16.2	41.8	3137.66
TRUCKEE BELOW RENO	22.2	19.0	22.4	26.9	22.4	39.0	62.5	98.4	73.6	24.7	20.9	23.2	455.3	34145.43
M & I DEFICIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.1	5.57
TM AG DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.1	.5	38.58

Run Number 10. Truckee Canal Disposal, 2000 Truckee Meadows Urbanization, 406 Criteria

1901-1975 STUDY PERIOD

MONTHLY AND ANNUAL AVERAGES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	75 YEAR GRAND TOTAL
TAHOE CITY PRECIP	1.62	3.38	5.42	6.28	5.22	4.30	2.09	1.19	.64	.25	.26	.51	31.1	2335.85
LAKE TAHOE-NET INFLOW	-31.0	-5.1	25.6	37.6	36.1	42.8	43.0	76.4	52.0	-3.5	-38.4	-42.9	182.9	13716.10
RELEASE	7.3	8.4	7.7	8.0	6.1	5.7	4.3	4.3	4.5	6.1	9.6	10.5	82.4	6181.54
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	.0	.0	.1	3.1	2.7	7.3	11.0	31.1	29.9	6.2	.0	.0	91.3	6850.76
CONTENT END OF MONTH	421.3	407.9	425.8	452.3	479.6	499.4	527.1	568.2	585.9	570.1	522.1	468.8	---	
PROSSER RESERVOR INFLOW	1.5	2.2	3.6	3.4	3.5	5.5	11.7	17.8	10.2	3.4	1.2	1.0	65.0	4877.50
RELEASE	1.5	1.8	2.2	2.3	2.1	2.4	2.2	1.0	2.0	8.6	7.6	2.2	35.9	2693.60
EVAPORATION	.1	.1	.0	.0	.0	.1	.1	.2	.3	.4	.3	.1	1.6	122.60
SPILL	1.1	.4	1.4	1.1	1.3	2.5	4.1	8.8	5.3	.9	.0	.0	27.1	2034.40
CONTENT END OF MONTH	8.6	8.6	8.5	8.5	8.7	9.1	14.4	22.2	24.7	18.2	11.5	10.1	---	
STAMPEDE RESERVOR INFLO	3.9	3.9	7.9	6.5	6.4	11.2	25.3	35.6	20.2	5.0	1.5	1.6	129.1	9682.40
RELEASE	7.0	3.8	4.7	4.4	3.9	5.1	3.3	2.1	2.9	3.7	7.9	9.4	58.1	4357.92
EVAPORATION	.6	.4	.2	.2	.2	.4	.6	1.3	1.6	1.8	1.8	1.2	10.5	790.80
SPILL	9.5	.3	1.9	1.3	1.0	3.1	11.3	17.4	10.5	1.1	.0	.0	57.5	4313.78
CONTENT END OF MONTH	164.7	164.2	165.2	165.9	167.1	169.7	179.8	194.6	199.8	198.1	189.9	180.8	---	
TOTALINFLO BOCA RESRVOR	16.5	4.1	6.8	5.7	5.0	8.4	15.2	20.1	13.7	5.0	8.0	9.4	117.8	8832.60
RELEASE	12.3	6.3	4.9	4.3	3.0	3.3	1.3	.3	1.6	4.3	12.9	15.4	70.0	5248.64
EVAPORATION	.1	.1	.1	.1	.1	.1	.2	.3	.4	.5	.4	.3	2.8	206.50
SPILL	4.1	.2	1.1	1.3	1.0	2.7	8.2	15.0	9.4	1.4	.0	.0	44.4	3336.96
CONTENT END OF MONTH	17.1	14.6	15.3	15.4	16.3	18.5	23.9	28.3	30.6	29.3	23.9	17.7	---	
OTHER FLOW ABOVE FARAD	4.8	5.9	8.2	9.6	9.4	18.1	38.3	50.5	35.6	13.6	6.2	8.8	209.1	15681.50
TRUCKEE RIVER AT FARAD	30.2	22.3	24.9	29.0	24.9	41.5	68.6	110.2	87.3	39.8	35.5	36.1	550.4	41277.40
FLOW AT VISTA	25.9	21.7	25.8	32.2	27.6	44.4	65.7	105.4	80.3	25.9	22.1	26.1	503.1	37729.05
TRUCKEE RIVER AT DERBY	25.9	21.7	25.8	32.2	27.6	44.4	65.6	104.9	79.9	25.3	21.6	25.7	500.5	37537.81
BY-PASS AT DERBY DAM	7.3	8.6	20.5	27.4	23.0	37.5	56.7	99.2	71.9	17.2	6.4	9.6	385.4	28907.70
INFLOW TO PYRAMID LAKE	8.9	9.8	21.1	27.9	23.4	38.1	58.0	99.7	72.9	17.9	7.4	10.4	395.6	29666.87
DIVERSION INTO TR.CANAL	18.6	13.0	5.3	4.9	4.6	6.9	8.9	5.6	8.0	8.1	15.1	16.1	115.0	8628.57
DIVERSION FROM TR.CANAL	.0	.0	.0	.0	.0	.0	.0	.5	1.9	1.7	1.4	.0	5.5	410.08
SHORTGE-TRUKEE DIVISION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.1	9.85
TERMINAL TR.CANAL FLOW	16.4	11.3	4.7	4.4	4.2	6.0	7.5	4.1	4.7	4.2	10.8	13.4	91.6	6873.59
WEST FORK INFLOW	1.6	2.3	3.0	2.7	2.9	4.2	12.9	24.8	16.2	6.1	2.7	1.6	81.0	6077.50
EAST FORK INFLOW	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
RELEASE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
EVAPORATION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SPILL	5.0	7.0	9.5	10.4	11.3	16.6	37.3	78.1	65.6	25.5	8.7	5.5	280.4	21028.50
CONTENT END OF MONTH	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	---	
SHORTGE-WESTFORK-CALIF	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTGE-WESTFORK-NEVADA	.1	.0	.0	.0	.0	.0	.0	.0	.5	2.6	4.6	4.4	12.1	908.54
SHORTGE-EAST FORK LANDS	.0	.0	.0	.0	.0	.0	.0	.0	.4	3.9	9.4	9.3	23.0	1726.56
SHORTAGE-BELOW JUNCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.2	.3	23.87
PROJ DPLTN(CARSN VALLY)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
OUTFLOW (CARSON VALLEY)	4.8	10.3	17.6	21.3	21.7	26.3	41.8	81.6	67.6	18.9	3.2	2.1	317.2	23786.60
SHORTAGE(C.V. - LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.1	.8	2.7	2.4	6.0	447.30
PROJ DPLTN(C.V.-LAHTN)	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
TOTAL INFLOW TO LAHTN	20.9	24.4	27.0	30.5	30.6	34.7	46.2	79.1	69.6	21.3	12.8	14.7	411.8	30886.33
RELEASE	28.5	13.0	.0	.0	.0	15.0	35.0	49.9	60.1	60.8	57.0	38.3	357.5	26813.68
EVAPORATION	.6	.3	.4	.6	.7	3.1	5.5	8.1	7.1	5.2	3.1	1.3	36.1	2703.80
SPILL	.0	.0	.0	.0	.3	.6	1.2	5.3	10.0	.2	.0	.0	17.6	1323.10
CONTENT END OF MONTH	53.4	64.5	91.1	121.0	150.6	166.5	171.1	186.9	179.4	134.5	87.2	62.2	---	
TCID CREDIT IN STAMPEDE	92.0	96.5	99.7	101.2	101.2	99.3	104.8	100.5	102.3	103.6	101.4	94.3	1196.8	89759.48
CARSON RIVER CREDIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
SHORTGE-CARSON DIVISION	1.5	.2	.0	.0	.0	.0	.0	.0	.1	2.2	3.1	1.5	8.5	636.32
PROJECT DPLTN ON AREA1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00
ORIGINAL SHORTAGE-AREA1	.1	.0	.0	.0	.0	.0	.0	.0	.2	1.2	2.5	2.3	6.4	478.55
SHORTAGE IN CARSN VALLY	.2	.0	.0	.0	.0	.0	.0	.0	1.1	7.7	16.6	16.2	41.8	3137.66
TRUCKEE BELOW RENO	21.4	16.4	19.7	24.0	19.7	36.0	60.2	98.8	72.6	21.7	19.2	22.4	432.3	32425.07
W & I DEFICIT	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.2	21.11
TM AG DEFICIT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.1	14.76

Run Number 11. Truckee Canal Disposal, 2000 Truckee Meadows Urbanization, 288 Criteria

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1901-1975  STUDY PERIOD                                MONTHLY AND ANNUAL AVERAGES                              75 YEAR GRAND TOTAL
                             OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP   TOTAL
       TAHOE CITY PRECIP     1.62   3.38   5.42   6.28   5.22   4.30   2.09   1.19    .64    .25    .26    .51   31.1       2335.85
LAKE TAHOE-NET INFLOW      -31.0   -5.1   25.6   37.6   36.1   32.8   43.0   76.4   52.0   -3.5  -38.4  -42.9  182.9      13716.10
                RELEASE      9.2    9.0    8.0    8.0    6.0    5.6    4.2    4.2    4.6    6.3   10.7   11.5   87.4       6552.06
                EVAPORATION   .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
                SPILL         .0     .0     .1    3.0    2.6    6.6   10.7   28.5   24.0    6.0     .0     .0   86.4       6480.24
    CONTENT END OF MONTH   411.6  397.5  415.1  441.8  469.3  490.0  518.0  561.8  580.2  564.4  515.3  460.9   ---
PROSSER RESERVOR INFLOW      1.5    2.2    3.6    3.4    3.5    5.5   11.7   17.8   10.2    3.4    1.2    1.0   65.0       4877.50
                RELEASE      1.4    1.8    2.2    2.3    2.1    2.7    2.2    1.0    2.1    8.8    7.7    2.5   36.7       2750.80
                EVAPORATION   .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1    1.6        121.90
                SPILL         .9     .4    1.4    1.1    1.3    2.3    4.1    8.8    5.3     .8     .0     .0   26.4       1977.90
    CONTENT END OF MONTH     8.4    8.4    8.4    8.5    8.6    9.1   14.4   22.2   24.7   18.1   11.3    9.6   ---
STAMPEDE RESERVOR INFLO      3.9    3.9    7.9    6.5    6.4   11.2   25.3   35.6   20.2    5.0    1.5    1.6  129.1       9682.40
                RELEASE      2.8    3.8    5.2    4.6    4.2   11.7   16.8    4.7    4.9    7.2    4.7    2.2   78.0       5846.61
                EVAPORATION   .5     .4     .2     .2     .2     .4     .5    1.0    1.3    1.5    1.5    1.0    8.8        662.60
                SPILL        5.2     .1     .6    1.2     .7    2.2    7.3   13.1    8.3     .7     .0     .0   39.4       2953.29
    CONTENT END OF MONTH   142.2  141.8  143.7  144.2  145.4  142.4  143.1  154.9  160.5  156.1  151.4  149.7   ---
TOTALINFLO BOCA RESRVOR      8.1    4.0    5.9    5.9    5.1   14.1   24.7   23.2   13.5    8.0    4.7    2.2  119.5       8960.80
                RELEASE      6.4    5.5    5.0    4.4    3.5   10.3   14.7    7.9    3.8    7.6    8.5    6.6   84.3       6323.55
                EVAPORATION   .1     .1     .1     .1     .1     .1     .2     .3     .4     .4     .4     .3    2.6        191.40
                SPILL        2.7     .0     .2     .4     .7    1.9    6.0   11.5    7.3     .9     .0     .0   32.0       2405.35
    CONTENT END OF MONTH    15.1   13.4   14.1   14.6   15.5   17.2   21.0   24.5   26.6   25.7   21.5   16.8   ---
OTHER FLOW ABOVE FARAD       4.8    5.9    8.2    9.6    9.4   18.1   38.3   50.5   35.6   13.6    6.2    8.8  204.1      15681.50
TRUCKEE RIVER AT FARAD      24.5   22.0   24.3   28.5   24.8   46.9   79.4  111.5   86.6   42.7   32.3   28.7  552.3      41421.40
FLOW AT VISTA               20.3   21.4   25.2   31.8   27.6   49.8   76.5  106.7   79.7   29.1   19.2   18.7  506.1      37954.80
TRUCKEE RIVER AT DERBY      20.3   21.4   25.2   31.8   27.6   49.8   76.4  106.2   79.3   28.5   18.7   18.4  503.5      37763.57
BY-PASS AT DERBY DAM        20.0   20.7   24.4   29.8   25.0   45.8   60.4   91.5   74.5   22.5   18.3   18.2  451.0      33824.64
INFLOW TO PYRAMID LAKE      19.7   20.8   24.5   30.1   25.3   46.1   62.8   93.3   74.6   22.2   17.6   17.5  454.2      34065.36
DIVERSION INTO TR.CANAL       .3     .7     .8    1.9    2.6    4.0   16.0   14.7    4.8    6.1     .4     .2   52.5       3938.90
DIVERSION FROM TR.CANAL       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
SHORTGE-TRUKEE DIVISION       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
TERMINAL TR.CANAL  FLOW       .2     .6     .7    1.7    2.3    3.5   13.9   12.7    4.0    5.1     .3     .1   45.3       3396.95
WEST FORK INFLOW             1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   16.2    6.1    2.7    1.6   81.0       6077.50
EAST FORK INFLOW             5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4      21028.50
                RELEASE       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
                EVAPORATION   .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
                SPILL        5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5  280.4      21028.50
    CONTENT END OF MONTH      .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0   ---
SHORTGE-WESTFORK-CALIF        .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4        478.55
SHORTGE-WESTFORK-NEVADA       .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4   12.1        908.54
SHORTGE-EAST FORK LANDS       .0     .0     .0     .0     .0     .0     .0     .0     .4    3.9    9.4    9.3   23.0       1726.56
SHORTAGE-BELOW JUNCTION       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3         23.87
PROJ DPLTN(CARSN VALLY)       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
OUTFLOW (CARSON VALLEY)      4.6   10.3   17.6   21.3   21.7   26.3   41.8   81.6   67.6   18.9    3.2    2.1  317.2      23786.60
SHORTAGE(C.V. - LAHTN)        .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4    6.0        447.30
PROJ DPLTN(C.V.-LAHTN)        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
TOTAL INFLOW TO LAHTN        5.9   14.1   23.0   27.8   28.7   32.7   53.8   88.9   69.2   22.8    3.1    2.9  373.1      27479.09
                RELEASE     20.5    9.4     .0     .0     .0   10.7   25.0   35.7   43.0   45.0   42.7   27.5  259.6      19466.25
                EVAPORATION  1.6     .7     .8     .9    1.0    4.4    7.8   11.7   10.4    8.2    5.7    2.9   56.1       4205.90
                SPILL         .0     .0    1.5    1.4    2.5    3.7    6.9   18.4   19.2     .2     .9     .0   54.7       4100.77
    CONTENT END OF MONTH   153.0  157.0  177.6  203.1  228.4  242.3  256.4  279.6  276.2  245.6  199.4  171.9   ---
ICID CREDIT IN STAMPEDE       .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
CARSON RIVER CREDIT        -72.3  -72.3  -72.3  -72.3  -72.3  -72.3  -72.3  -72.3  -72.3  -73.3  -73.3  -73.3 -870.4     -65282.38
SHORTGE-CARSON DIVISION       .9     .0     .0     .0     .0     .0     .0     .0     .0     .0     .3    1.0    2.1        161.25
PROJECT DPLTN ON AREA1        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0           .00
ORIGINAL SHORTAGE-AREA1       .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3    6.4        478.55
SHORTAGE IN CARSN VALLY       .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   16.6   16.2   41.8       3137.66
TRUCKEE BELOW RENO          15.8   16.1   19.1   23.6   14.7   41.4   71.1  100.1   72.0   24.9   16.4   15.1  435.4      32654.19
M & I DEFICIT                 .2     .1     .0     .0     .0     .0     .0     .0     .1     .3     .5     .1    1.3         97.68
TM AG DEFICIT                 .1     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .2         23.31
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Run Number 11a. Truckee Canal Disposal, 1985 Truckee Meadows Urbanization, 288 Criteria

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1901-1975  STUDY PERIOD                           MONTHLY AND ANNUAL AVERAGES                            75 YEAR GRAND TOTAL

                              OCT    NOV    DEC    JAN    FEB    MAR    APR    MAY    JUN    JUL    AUG    SEP   TOTAL
    TAHOE CITY PRECIP        1.62   3.38   5.42   6.28   5.22   4.30   2.09   1.19    .64    .25    .26    .51    31.1      2335.85
LAKE TAHOE-NET INFLOW       -31.0   -5.1   25.6   37.6   36.1   32.8   43.0   76.4   52.0   -3.5  -38.4  -42.9   182.9     13716.10
           RELEASE            8.5    8.5    7.9    8.0    6.0    5.6    4.2    4.2    4.5    6.3   10.6   11.6    85.9      6443.05
           EVAPORATION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
           SPILL               .0     .0     .1    3.1    2.8    6.8   10.8   28.9   29.4    6.0     .0     .0    87.9      6589.25
  CONTENT END OF MONTH      413.6  400.1  417.7  444.3  471.6  492.1  520.0  563.3  581.4  565.7  516.6  462.2     ---
PROSSER RESERVOR INFLOW       1.5    2.2    3.6    3.4    3.5    5.5   11.7   17.8   10.2    3.4    1.2    1.0    65.0      4877.50
           RELEASE            1.4    1.8    2.2    2.3    2.1    2.7    2.2    1.0    2.1    8.8    7.7    2.5    36.6      2745.23
           EVAPORATION         .1     .1     .0     .0     .0     .1     .1     .2     .3     .4     .3     .1     1.6       122.00
           SPILL               .9     .4    1.4    1.1    1.3    2.3    4.1    8.8    5.3     .8     .0     .0    26.4      1983.37
  CONTENT END OF MONTH        8.5    8.5    8.5    8.5    8.6    9.1   14.4   22.2   24.7   18.1   11.3    9.7     ---
STAMPEDE RESERVOR INFLO       3.9    3.9    7.9    6.5    6.4   11.2   25.3   35.6   20.2    5.0    1.5    1.6   129.1      9682.40
           RELEASE            2.6    3.8    4.8    4.7    4.3   10.5   18.0   10.2    5.1    5.2    2.9    2.1    74.2      5566.36
           EVAPORATION         .5     .4     .2     .2     .2     .4     .5    1.0    1.3    1.5    1.5    1.1     8.9       668.80
           SPILL              7.3     .2    1.1    1.2     .9    2.3    7.8   13.3    8.0    1.0     .0     .0    43.0      3227.34
  CONTENT END OF MONTH      144.3  143.9  145.8  146.2  147.1  145.1  144.1  155.2  161.0  158.3  155.4  153.8     ---
TOTALINFLO BOCA RESRVOR       9.9    4.0    6.0    6.0    5.3   13.1   26.4   24.0   13.4    6.2    2.9    2.1   119.4      8954.60
           RELEASE            7.0    6.1    4.9    4.5    3.6    9.1   15.6    8.3    4.1    5.5    6.9    6.5    82.1      6155.15
           EVAPORATION         .1     .1     .1     .1     .1     .1     .2     .3     .4     .4     .4     .3     2.6       193.10
           SPILL              3.2     .0     .5    1.0     .8    2.1    6.3   12.0    7.2    1.0     .0     .0    34.1      2565.85
  CONTENT END OF MONTH       15.9   13.7   14.3   14.7   15.5   17.2   21.6   25.0   26.7   25.9   21.6   16.9     ---
OTHER FLOW ABOVE FARAD        4.8    5.9    8.2    9.6    9.4   18.1   38.3   50.5   35.6   13.6    6.2    8.8   209.1     15681.50
TRUCKEE RIVER AT FARAD       25.0   22.0   24.4   28.8   25.3   46.0   80.7  112.9   87.1   40.8   30.5   28.6   552.2     41413.40
FLOW AT VISTA                22.6   24.1   28.0   35.0   30.8   52.0   80.6  109.7   83.4   31.7   21.2   21.2   540.3     40524.66
TRUCKEE RIVER AT DERBY       22.6   24.1   28.0   35.0   30.8   52.0   80.5  109.1   83.0   31.1   20.7   20.9   537.8     40333.43
BY-PASS AT DERBY DAM         22.2   22.8   26.6   32.3   27.5   47.1   61.4   90.7   75.4   23.1   18.0   20.7   467.8     35081.52
INFLOW TO PYRAMID LAKE       21.9   23.0   26.8   32.5   27.8   47.5   64.2   93.0   76.3   23.3   17.9   20.0   474.1     35557.02
DIVERSION INTO TR.CANAL        .3    1.2    1.4    2.7    3.4    4.9   19.1   18.5    7.6    8.1    2.6     .2    70.0      5251.91
DIVERSION FROM TR.CANAL        .0     .0     .0     .0     .0     .0     .0     .7    1.6    1.5    1.3     .0     5.0       375.77
SHORTGE-TRUKEE DIVISION        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0         6.69
TERMINAL TR.CANAL  FLOW        .3    1.0    1.3    2.4    3.1    4.3   16.7   15.4    4.7    4.8     .3     .1    54.4      4080.53
WEST FORK INFLOW              1.6    2.3    3.0    2.7    2.9    4.2   12.9   24.8   16.2    6.1    2.7    1.6    81.0      6077.50
EAST FORK INFLOW              5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5   280.4     21028.50
           RELEASE             .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
           EVAPORATION         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
           SPILL              5.0    7.0    9.5   10.4   11.3   16.6   37.3   78.1   65.6   25.5    8.7    5.5   280.4     21028.50
  CONTENT END OF MONTH         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     ---
SHORTGE-WESTFORK-CALIF         .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3     6.4       478.55
SHORTGE-WESTFORK-NEVADA        .1     .0     .0     .0     .0     .0     .0     .0     .5    2.6    4.6    4.4    12.1       908.54
SHORTGE-EAST FORK LANDS        .0     .0     .0     .0     .0     .0     .0     .0     .4    3.9    9.4    9.3    23.0      1726.56
SHORTAGE-BELOW JUNCTION        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .2      .3        23.87
PROJ DPLTN(CARSN VALLY)        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
OUTFLOW (CARSON VALLEY)       4.8   10.3   17.6   21.3   21.7   26.3   41.8   81.6   67.6   18.9    3.2    2.1   317.2     23786.60
SHORTAGE(C.V. - LAHTN)         .0     .0     .0     .0     .0     .0     .0     .0     .1     .8    2.7    2.4     6.0       447.30
PROJ DPLTN(C.V.-LAHTN)         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
TOTAL INFLOW TO LAHTN         3.9   12.6   21.6   26.6   27.5   31.6   54.7   90.3   69.6   21.9    2.4     .9   363.5     27262.51
           RELEASE           20.4    9.3     .0     .0     .0   10.7   25.0   35.7   43.0   45.0   42.6   27.5   259.3     19445.37
           EVAPORATION        1.5     .7     .8     .9    1.0    4.2    7.5   11.4   10.3    8.1    5.6    2.9    54.7      4102.30
           SPILL               .0     .0    1.3    1.1    1.7    2.4    5.5   15.8   18.0     .2     .8     .0    46.8      3512.77
  CONTENT END OF MONTH      145.6  148.1  167.6  192.3  217.1  231.4  248.2  275.6  273.9  242.5  195.8  166.4     ---
TCID CREDIT IN STAMPEDE        .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
CARSON RIVER CREDIT         -70.0  -70.0  -70.0  -70.0  -70.0  -70.0  -70.0  -70.0  -70.0  -71.0  -71.0  -71.0  -843.2    -63242.98
SHORTGE-CARSON DIVISION       1.0     .1     .0     .0     .0     .0     .0     .0     .0     .0     .4    1.0     2.4       182.13
PROJECT DPLTN ON AREA1         .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0     .0      .0          .00
ORIGINAL SHORTAGE-AREA1        .1     .0     .0     .0     .0     .0     .0     .0     .2    1.2    2.5    2.3     6.4       476.55
SHORTAGE IN CARSN VALLY        .2     .0     .0     .0     .0     .0     .0     .0    1.1    7.7   16.6   16.2    41.8      3137.66
TRUCKEE BFLOW RENO           16.7   18.8   21.9   26.7   23.0   43.6   74.8  101.5   73.8   25.4   16.0   15.4   457.7     34326.78
M & I DEFICIT                  .0     .0     .0     .0     .0     .0     .0     .0     .0     .1     .1     .0      .2        16.71
TM AG DEFICIT                  .2     .0     .0     .0     .0     .0     .0     .0     .1     .2     .3     .2     1.0        77.42
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